13. MANUALS/GUIDELINES USED FOR CAPACITY DEVELOPMENT

13.1 Manual for Surveying Compass

13.2 Working Draft of Guideline for Supervision of Rural Water Supply Projects to GARWSP Engineers

13.3 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Jabal Al Taraf

13.4 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Al Kharaba

13.5 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Masneat Abdul Aziz

13.6 Guidelines for Community Mobilization to Establish Water Users Associations

13.7 Manual for Health Education

13.1 Manual for Surveying Compass

REPUBLIC OF YEMEN
GENERAL AUTHORITY FOR RURAL WATER SUPPLY PROJECTS
SANA'A

الجمهورية اليمنية
الهيئة العامة لمشاريع مياه الريف
صنعاء

Rural Water Supply Component of the Study for Water Resources Management and Rural Water Supply Improvement in the Republic of Yemen
دراسة لإدارة الموارد المائية وتحسين إمداد مياه الريف
(مكون إمداد مياه الريف)
فريق الدراسة التابعة لوكالة جايكا
(الوكالة اليابانية للتعاون الدولي)
JICA Study Team

دليل بوصلة المساحة للنوع اوشيكاتا تراقون

Manual for Surveying Compass (Ushikata Tracon)

أكتوبر 2006م

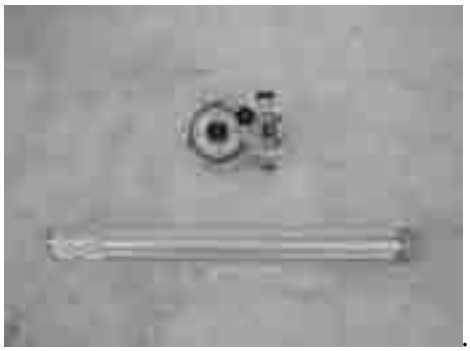
Prepared by JICA Study Team

دليل بوصلة المساحة للنوع اوشيكاتا تراقون

Manual for Surveying Compass (Ushikata Tracon)

<Set>

1. Check the Surveying set. **مراجعة سريعة لطقم المساحة**



. Head and Tripod رأس **ومرجل**

2. Extend each leg and try to make an equilateral triangle.
   مد كل رجل على حدا وحاول أن تعمل مثلث بشكل متساوي

.

3. Turn the pointed screw and remove the cap from top of tripod.
   فوك مسمار قلاووظ المشار إليه و أزيل الغطاء من رأس المرجل

.

.

4. Take out the Head from the case. **خرج الرأس من العلبة**

5. Stand the Joint Pin. **نصب مشبك المفصل**

6. Stand the Telescope. **أرفع التلسكوب إلى وضع زاوية مستقيمة**

7. Fasten the telescope part with pointed screw but not too tight.
ثبت هذا الجزء من التلسكوب بواسطة مسمار القلاووظ المشار إليه ولكن ليس بصورة قوية.

8. Attach the head to the tripod using the lower joint pin
أربط الرأس إلى المرجل مستخدماً مشبك المفصل الأسفل

9. Fasten the upper joint pin. **ثبت مشبك المفصل الأعلى**

<Survey> مخطط المسح

1. Adjust the Tracon to be level. **ضع المرجل على مستوى متوازن**

① Loosen the upper joint pin a little. **فوك قليلاً مشبك المفصل الأعلى**

② Adjust the Magnetic Compass manually by leveling the 2 bubble indicators (pointed).

أضبط البوصلة المغنطيسية عن طريق اليد ومع مراجعة نقطة البق بقة المشار إليهما وأضعهما متساويات

③ Fasten the upper joint pin again. **مرة أخرى أربط مشبك المفصل الأعلى**

2. Free magnetic needle with pointed screw.

أطلق إبرة المغنطيسية. بواسطة مسمار القلاووظ المشار إليه

3. Remove the lens cap. **يتم إزالة غطاء العدسة**

4. Free the horizontal turning screw. **فوك مسمار قلاووظ الملتوي أفقي**

5. Turn the Tracon to the target roughly through the pointing device.
نشن على الهدف بالتقريب عبر الجزء المشار إليه.

6. Fasten the screw for turning. **أربط مسمار القلاووظ للتدوير**

7. Adjust the Stadia line inside of the telescope. **أضبط الخطان المتقطعتان داخل جهاز التلسكوب**

9. Adjust the focus of the telescope. **أضبط عدسة التلسكوب**

10. Fit the Vertical Stadia line with the target by a slight turn of the screw.
دور الخطان المتقطعتان داخل جهاز التلسكوب العمودي مع الهدف مستخدما قليل من دوران مسمار القلاووظ

11. Fit the Horizontal Stadia line with the target using the up down control.
دور الخطان المتقطعان الأفقان مع التهديف مستخدما محكم المتحرك إلى الأعالي والأسفل

<Read the Angle> اقرأ درجة الزاوية

1. Vertical عموديا

Read the Red Arrow. This shows " 6 ° 40 ′ ". اقرأ السهم الأحمر. هذا يبين (6,40) درجة.

2. Horizontal أفقي

①Adjust 0 degree. Turn 0-BACK lever 0-BACK side up. Turn the head part carefully to 0 point. When reaching 0 point, it stops automatically. Watch the scale of horizontal angle. 1- أضبط درجة صفر، دور الرافعة الأسود على أساس ان تكون جانب الصفر فوق، والرافعة المشار إليها في الصورة موجهة إلي الأسفل،

حرك الجزء الرأسي على مهلة إلى أن يصل نقطة الصفر، وعندما يصل إلى نقطة الصفر، فيتوقف تلقائياً.

تابع المقياس الأفقي.

②Point to the first target. أشر إلى الهدف الأولى

③Turn 0-BACK lever to FREE side up. Point to the second target.

حرك الرافعة إلى وضع صفر وعلى أن يكون الجانب الأسود فوق

أشر إلى الهدف الثاني .

④ Now you get the internal angle of first and second targets.

الآن تحصل على الزاوية الداخلية لهدفان الأول والثاني.

Read degree where the upper “0” indicates. → 273 °

اقرأ الدرجة، حيث يظهر (الصفر) على الجانب الأعلى (درجة)273

Read minutes where upper and lower lines coincide. → 55 ′

اقرأ الدقائق، عندما تلتقي خط الشعرة الفوقي والتحت و تكون خط واحد مستقيما، ودقيقة 55

The internal angle is 273 ° 55 ′ **يكون الزاوية الداخلية 273 درجة و دقيقة 55**

Fasten the magnetic screw when packing the instrument.

أربط إبرة المغنطيسية (مسمار القلاووظ المشار إليه) قبل أن يضع الآلة في العلبة.

13.2 Working Draft of Guideline for Supervision of Rural Water Supply Projects for GARWSP Engineers

Rural Water Supply Component of
The Study for Water Resources Management and
Rural Water Supply Improvement
in the Republic of Yemen

Working Draft

of

Guideline for Supervision

of Rural Water Supply Projects

for

GARWSP Engineers

July 2007

Prepared by
JICA Study Team

Contents of Guideline

0. Necessity to prepare the Guideline

- To control the project systematically through the initiative of GARWSP
- To share the engineers' knowledge and skills for supervision in written form through clearly-stated rules
- To retain equably good quality of supervision for any projects around the country at any time by any engineer

1. Objectives of Supervision

- To direct contractors and communities to secure safety and peace <**Safety Management**>
- To secure good quality of works, facilities, materials and equipment and to direct contractors and communities to conform with design and specifications <**Quality Management**>
- To control construction works on schedule <**Progress Management**>
- To control construction works with cost-consciousness <**Cost Management**>

2. Duties and Qualifications desired as a Supervisor

- Ability and Skills in Communication and Coordination
- Ability and Skills for Problem-Solving
- Ability and Skills for Organizing
- Sense of Confidence and Responsibility
- Sense of Judgment and Decision-Making
- Sense of Mobility, Flexibility and Balance
- Controlled Patience and Gentlemanship
- Appropriate Experience and Accuracy

3. Supervision prior to Commencement of Construction Work

3.1. Review of Project-Related Documents

The Supervisor must carefully read the project-related documents such as contract, tender documents, design and drawings. If there are any mistaken descriptions or questions from the Contractor, the Supervisor must take immediate action to respond.

3.2. Construction Schedule

An overall schedule of the construction work must be prepared by the Contractor. The Supervisor must check the feasibility and finally approve it.

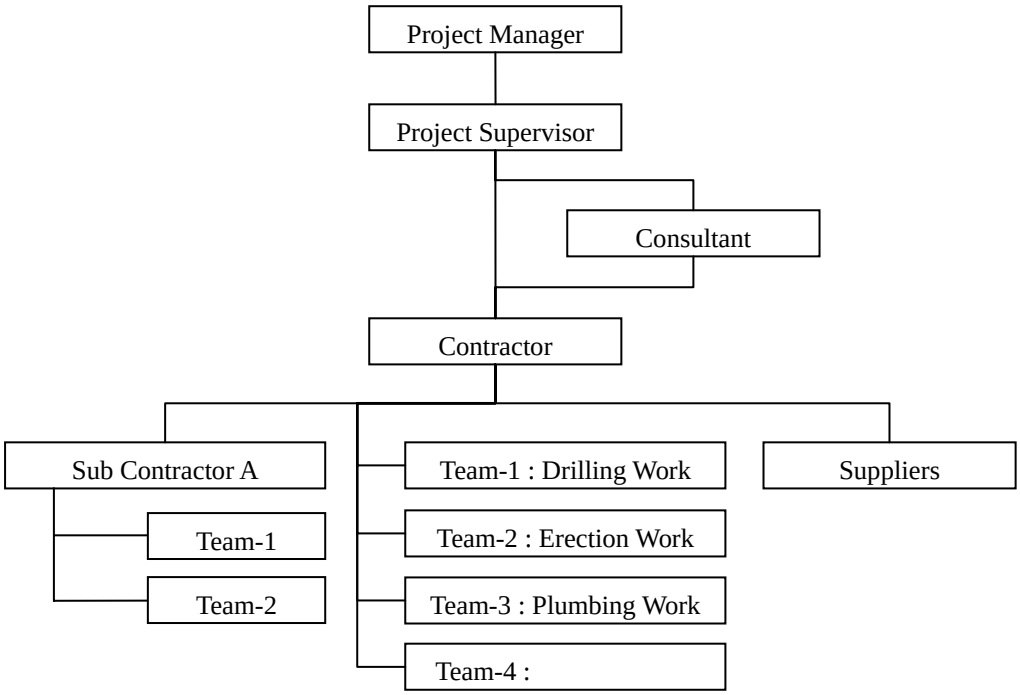
Example of Overall Construction Schedule

Work Items	Month-1			Month-2			Month-3			Month-4		
	10	20	30	10	20	30	10	20	30	10	20	30
Mobilization / Demobilization												
Drilling Work												
Pumping Test												
Installation of Pumping Unit												
Erection / Pump House												
Erection / Water Tank												
Plumbing / Pumping Main												
Plumbing / Distribution Main												
Test Operation												
Completion												
Hand Over												

3.3. Project Implementation Organization and Communication Network

Project Implementation organization and communication network for the implementation must be prepared by the Contractor. The Supervisor must check their appropriateness.

Example of Implementation Organization



3.4. Personnel Plan

Personnel plan for implementation of the project must be prepared by the Contractor. The Supervisor must check its appropriateness and validity.

3.5. Approval List

The Supervisor shall make a list of equipment and materials to be approved, prior to the procurement. The list must be informed to the Contractor.

Example of Approval List

	Equipment and Materials	Reference
1	Casing Pipe and Screen	Design Specification, Manufacturer
2	Pump (Vertical or Horizontal Shaft, Submersible Motor Pump, etc)	Design Specification, Manufacturer
3	Diesel Engine or Engine Generator	Design Specification, Manufacturer
4	Accessories (Gear, Cardan Shaft, Control Panel, Electric Wire, etc)	Design Specification, Manufacturer
5	Column Pipe (Galvanized Steel, Cast Iron, etc)	Design Specification, Product, Standard
6	Cement for Concrete	Product Company, Standard
7	Sand for Concrete	Production Area, Particle Size Distribution
8	Gravel for Concrete	Production Area, Particle Size Distribution
9	Water for Concrete	Clean Water
10	Reinforcing Steel Bar for Concrete	Manufacturer, Standard, Tensile Strength
11	Galvanized Steel Pipe for Pipeline	Manufacturer, Standard
12	Fittings (Flange, Elbow, T-joint, Reducer, etc)	Manufacturer, Standard
13	Valves (Gate Valve, Check Valve)	Manufacturer, Standard
14	Meters (Water Meter, Pressure Gauge)	Manufacturer, Standard
15		

3.6. Inspection List

The Supervisor shall make a list of construction work processes to be inspected, prior to the commencement of each work. The list must be informed to the Contractor.

Example of Inspection List

	Process to be Inspected	Reference
1	Drilling Work	Design Specifications
2	Installation of Casing Pipe and Screen	Design Specifications
3	Pumping Test	Design Specifications
4	Pumping Unit, Accessories and Column Pipe at Warehouse before Transport	Design Specifications
5	Installation of Pumping Unit, especially Parts to be submersed	Design Specifications
6	Installation of Column Pipe	Design Specifications
7	Placing of Reinforcing Steel Bar for Concrete Structure	Design Specifications, Manual, Practice
8	Formwork for Concrete Structure	Design Specifications, Manual, Practice
9	Concrete Mixing and Casting Work for Concrete Structure	Design Specifications, Manual, Practice
10	Curing of Concrete Structure	Design Specifications, Manual, Practice
11	Cast Concrete of Concrete Structure	Design Specifications, Manual, Practice
12	Masonry of Concrete Block or Stone Structure	Design Specifications, Manual, Practice
13	Plastering of Concrete Structure	Design Specifications, Manual, Practice
14	Installation of Doors, Widows and Steel Products	Design Specifications, Manual, Practice
15	Painting Work	Design Specifications, Manual, Practice
16	Plumbing Work of Pipelines	Design Specifications, Manual, Practice
17	Installation of Valves and Meters	Design Specifications, Manual, Practice
18	Test Operation of Pumping Unit	Manual, Practice
19	Flow Examination of Pipelines	Practice
20	Water Leakage Test of Water Tank	Practice

3.7. Site Transfer

In witness of community and local councils if necessary, the Supervisor must arrange the site transfer for the Contactor to show the location of facilities and the route of pipelines, and confirm any obstacles and land-use availability. If any permissions and licenses from other authorities or agencies are needed, the Supervisor shall proceed to take immediate action.

3.8. Sharing of Responsibilities on the Project with Community

The Supervisor must arrange for discussions on sharing of responsibilities on the project with the community, such as securing of land for facilities, preparation of access road, construction of pump house if necessary, pipe laying and so on by the community.

4. Supervision during Construction Work

4.1. How and What to Supervise

The Supervisor must supervise the construction works by the Contractor while paying attention to the following measures at all times.

- Progress Control
- Quality Control
- Procurement Control
- Safety Measure Control
- Environmental Measure Control

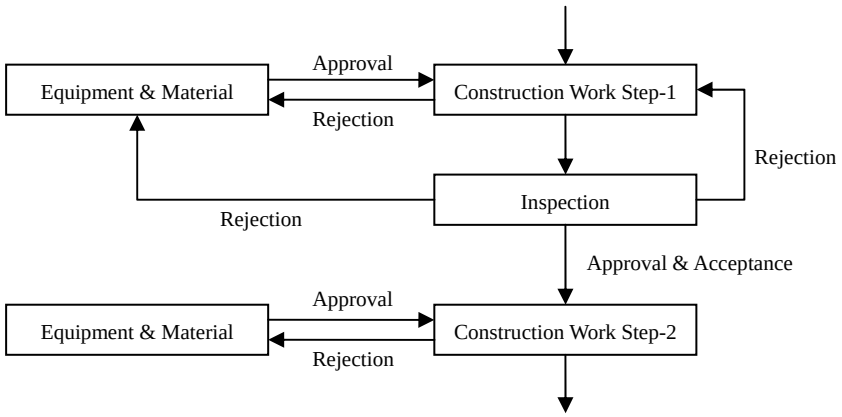
4.2. Progress Control

The Supervisor must supervise and be aware of the accurate and latest progress of construction works at all times through regular meetings, report and site visit, and also control the procedure of construction works by comparison between schedule and progress. In case the construction works fall behind schedule, the Supervisor must direct the Contractor to catch up.

4.3. Quality Control

Based upon the approval and inspection lists above-mentioned, the Supervisor shall make check sheets of each construction work process, and supervise the construction work more practically with the check sheets as a record of construction works and the Supervisor's performance. In principle, the Contractor is not allowed to proceed to the next work without the approval of materials and equipment as well as of inspection and the acceptance by the Supervisor. Examples of check sheets are shown in the Annex.

Flow of Quality Control



4.4. Procurement Control

The Supervisor must supervise the procurement of main equipment and materials by the Contractor to control the construction works smoothly.

4.5. Safety Measure Control

The Supervisor must supervise the safety measures taken by the Contractor for himself and the community to prevent any accidents or injuries during the construction period.

4.6. Environmental Measure Control

The Supervisor must supervise the environmental measures taken by the Contractor to conserve the natural environment and prevent pollution of the community's living environment from construction waste and debris.

4.7. Recording

All activities of supervision must be recorded on paper. Photographs will definitely help the record as visual evidence of works.

5. Supervision after Completion of Construction Work

5.1. Final Inspection of Completion

The Supervisor must make final inspection of overall constructed facilities and equipment in witness of the community and local council if necessary, and issue the certificate of completion to the Contractor on his/her responsibility as a supervisor.

5.2. Handover of Constructed Facilities

The Supervisor must arrange for the legal handover of constructed facilities and equipment to the community at an appropriate time.

5.3. Completion Report and Drawings

The Supervisor must make a completion report and drawings of the constructed facilities, or oblige the Contractor to do it.

5.4. Operation and Maintenance Manual

The Supervisor must prepare an operation and maintenance manual of the facilities for the community.

5.5. Document Safekeeping

All project-related documents must be saved and must be comprehensible and accessible for anybody. Examples of project-related documents are as follows:

- Design drawings, specifications, tender documents and so on
- Documents issued during the project
- Minutes of discussion, agreement and so on
- Approval and inspection lists
- Catalogs and warranty letters of approved equipment and materials
- Check sheets
- Completion report and drawings
- Operation and Maintenance Manual
- Photographic records

6. For Improved Supervision and Construction

6.1. Efficient Application of Guideline

Based upon this Guideline, the Supervisor is required to make a separate supervision plan for each project because the project scale and conditions are different from each other.

6.2. Construction Self-Quality Control by the Contractor

It is necessary for GARWSP to induce the Contractor to focus consciousness on quality control process through self-inspection, photographic records and other necessary procedures.

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Drilling, Installation of Casing Pipe and Screen, and Pumping Test

Inspection Item : Production Well and its Structure

	Category	Check Items	Accept / Reject	Remarks
1	Drilling	Diameter : Well Bottom Depth : Soil Condition: Flow Rate by Triangular Notch Weir :		
2	Installation of Casing Pipe and Screen	Diameter : Casing Depth : Screen Position : Welding : Centralizer : Alignment :		
3	Well Completion	Gravel Packing : Cementation :		
4	Pumping Test	Pumping Rate : Static Water Level : Dynamic Water Level : Step Drawdown Test : Constant Discharge Test : Time Recovery Test ; Recording :		
5				
6				

Supervisor, GARWSP Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Pumping Unit, Accessories and Column Pipe before Transport

Inspection Item : Equipment and Materials

	Category	Check Items	Accept/Reject	Remarks
1	Pump	Manufacturer : Model : Serial No : No of Impellers : Condition :		
2	Accessories	Manufacturer : Model : Quality & Quantity :		
3	Diesel Engine and Engine Generator	Manufacturer : Model : Serial No : Condition :		
4	Column Pipe	Manufacturer : Material : Diameter : Bolt & Nut : Quality & Quantity :		
5				
6				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Installation of Pumping Unit, Accessories and Column Pipe

Inspection Item : Equipment and Materials

	Category	Check Items	Accept/Reject	Remarks
1	Vertical Shaft Pump	Re-Confirmation of Equipment : Setting before Installation : Installation Depth : Installation of Unit Drive :		
2	Submersible Motor Pump	Re-Confirmation of Equipment : Setting before Installation : Electric Wiring : Installation Depth :		
3	Horizontal Pump	Re-Confirmation of Equipment : Setting before Installation : Installation Condition :		
4	Installation of Column Pipe	No. of Pipes : Connection :		
5	Diesel Engine and Engine Generator	Position & Direction : Fixing on Foundation : Setting : Exhaust Ventilation :		
6	Accessories	Alignment of Cardan Shaft : Installation of Control Panel : Electric Wiring :		
7				
8				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Concrete Work of Pump House or Water Tank

Inspection Item : Footing, Beam, Floor, Column, Wall, Slab, Roof

	Category	Check Items	Accept/Reject	Remarks
1	Materials	Cement : Sand : Gravel : Water : Reinforcing Steel Bar :		
2	Concrete Mixing	Mixing Ratio : Mixing Time and Degree: Slump Test :		
3	Concrete Casting	Casting Time : Compaction with Vibration : Weather & Temperature :		
4	Formwork	Dimension : Horizontality and Verticality : Surface Condition :		
6	Placing of Reinforcing Steel Bar	Diameter : Quantity : Length : Joint : Position : Thickness of Overburden :		
7	Curing	Moistening : Period :		
8	Cast Concrete	Surface Condition:		

Supervisor, GARWSP Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Masonry Work with Concrete Block for Pump House or Stone for Water Tank

Inspection Item : Wall

	Category	Check Items	Accept/Reject	Remarks
1	Materials	Size : Quality : Condition :		
2	Masonry	Horizontality and Verticality : Joint :		
3				
4				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Plastering Work of Pump House or Water Tank

Inspection Item : Floor, Beam, Wall, Column, Slab

	Category	Check Items	Accept/Reject	Remarks
1	Materials	Cement : Sand : Water :		
2	Mixing	Mixing Ratio : Mixing Time and Degree: Slump Test :		
3	Plastering	Thickness : Moistening : Surface Condition :		
4				
5				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Installation of Door, Windows and Steel Product

Inspection Item : Door, Window and Steel Product

	Category	Check Items	Accept/Reject	Remarks
1	Material	Material : Quality : Condition : Size :		
2	Installation	Tight Fixing : Opening and Closing :		
3				
4				
5				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Painting Work

Inspection Item : Parts to be painted

	Category	Check Items	Accept/Reject	Remarks
1	Material	Color : Quality :		
2	Painting	Evenness : Two Coats :		
3				
4				
5				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Plumbing Work and Installation of Valve and Meter

Inspection Item : Each Section of Pipeline

	Category	Check Items	Accept/Reject	Remarks
1	Material	Manufacturer : Diameter : Quantity :		
2	Plumbing	Pipeline Route : Diameter : Connection : Bending : Concrete Support :		
3	Valve and Meter	Location : Chamber :		
4				
5				

Supervisor, GARWSP

Contractor

Annex: Examples of Check Sheet for Inspection

Name of Project & Site :

Date and Time :

Work Category : Test Operation, Flow Examination and Water Leakage Test

Inspection Item : All Facilities

	Category	Check Items	Accept/Reject	Remarks
1	Pump	Operation : Abnormal Noise : Abnormal Vibration : Water Flow : Pressure :		
2	Diesel Engine and Engine Generator	Operation : Abnormal Noise : Abnormal Vibration : Heating : Revolution : Voltage, Ampere :		
3	Accessories	Cardan Shaft : Control Panel : Valve, Meter, Gauge :		
4	Water Tank	Water Leakage :		
5	Pipeline	Water Leakage : Water Flow and Pressure at terminal point:		
6				
7				

Supervisor, GARWSP

Contractor

13.3 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Jabal Al Taraf

Technical Operation and Maintenance Manual

for

Constructed Rural Water Supply Facilities

in

Jabal Al Taraf, Al Mahweet District
Al Mahweet Governorate

Prepared by JICA Study Team

0. Introduction

Groundwater is limited. However, it can be sustainable if you pump up and use water appropriately with consciousness on water resources conservation for the future, and also if water supply facilities are operated and maintained properly.

1. Community Information and Design Criteria

- Design Period : 10 years
- Growth Rate : 2.87%/year
- Present Population : 2,727 people @2006
- Design Population : 3,638 people @2016
- Unit Water Consumption : 40 lit/person/day
- Design Daily Consumption : 145.5 m^3/day

2. Summary of Facilities

Facility	Quantity	Remarks
Pump House with Pumping Unit for Well	1	Pumping unit was newly replaced.
Pump House with Pumping Unit for Booster	1	Pumping unit was newly replaced.
Ground Water Tank for Booster	1	25m^3
Ground Water Tank for Distribution	1	100m^3
Pumping Main Pipeline	2,038m	4inch, Stage-1st/1,320m, Stage-2nd/718m
Distribution Main Pipeline	-	House connection

3. Well Information and Capacity resulted from Pumping Test

- Well Bottom Depth : 165 m
- Casing Diameter : 8-5/8 inch
- Safe Yield : 4.4 lit/sec, 264 lit/min, 15.8 m^3/hr
- Static Water Level : 26.0 m
- Dynamic Water Level : 33.8 m
- Drawdown : 7.8 m

4. Pumping Unit Information

4.1 Pumping Unit for Well (Pump and Diesel Engine)

	Pump	Diesel Engine
Design Specification	Pumping Rate : 4.4 lit/sec Total Head : 166 m	-
Type	Vertical Shaft Pump	-
Product & Model	Pump : Caprari/P6C/3/14/20A, 2650rpm, Italy <6 impellers removed from P6C/3/20/20A> Drive Unit : Caprari/R26/3L/20, R/1:1.8, Italy Cardan Shaft : CSN/Top-Quality, Germany	MWM/D229-6/55kW(75 HP)@1,500rpm, Brazil
Serial No.	Pump : 151763/43 Drive Unit : 151717/11	C1N197051
Pump Install. Depth	57 m (Design/45 + Extra/12)	-
Column Pipe	Carbon Steel, 3 inch, 3mL 19 pieces (Design/15 + Extra/4)	-
Accessories	Gate Valve : Al Hababi, GVP/BS5163/PN16/3inch, Italy Check Valve : Al Hababi, GVP/BS5153/PN16/3inch, Italy Water Meter : Kent/PN16/DN80mm(3inch) Pressure Gauge : Wika/40bar/EN837-1, Germany	

4.2 Pumping Unit for Booster (Pump and Diesel Engine)

	Pump	Diesel Engine
Design Specification	Pumping Rate : 4.4 lit/sec Total Head : 208 m	-
Type	Horizontal Multistage Pump	-
Product & Model	Pump : Panelli/PMO40-65/8, 2650rpm, Italy <4 impellers removed from PMO40-65/12> Gear box: Techno Drive/BD290/150, Italy and Twin Disc/RM120, R/0.67S, Italy Cardan Shaft : CSN/ Top-Quality, Germany	MWM/D229-6/55kW(75 HP)@1,500rpm, Brazil
Serial No.	Pump : 107/31 Gear : 12.05 and 1202345	C1N197049
Accessories	Gate Valve : Al Hababi, GVP/BS5163/PN16/3inch, Italy Check Valve : Al Hababi, GVP/BS5153/PN16/3inch, Italy Water Meter : B-Meters/PN16/DN80mm(3inch), Italy Pressure Gauge : Wika/40bar/EN837-1, Germany	

5. Actual Operational Information

- Static Water Level measured on 19/June/2007 : 26.2 m

5.1 Pumping Unit for Well (Pump and Diesel Engine)

- Ideal Speed of Diesel Engine : 1,450 rpm
- Reading of Pressure Gauge : 11.5 - 12.0 bar
- Pumping Rate : 4.3 - 4.5 lit/sec
- Assumed Daily Pumping Hours : less than 9.2 hrs/day
- Assumed Dynamic Water Level : 34.0 m

5.2 Pumping Unit for Booster (Pump and Diesel Engine)

- Ideal Speed of Diesel Engine : 1,670 rpm
- Reading of Pressure Gauge : 17.5 bar
- Pumping Rate : 4.2 - 4.4 lit/sec
- Assumed Daily Pumping Hours : less than 9.2 hrs/day

6. Daily Operational Manual

6.0 Introduction

- Only the operator appointed by the community-based water committee is allowed to operate or maintain all facilities and equipment.
- All facilities and equipment should be kept clean and protected from vandalism.
- Only the necessary amount of water should be pumped up from the well.
- Water should not be wasted, and over-flow should be avoided.
- Daily pumping hours should be set and regulated according to the practical operation and actual consumption, but not more than approximately **9** hours per day.
- Operating the pump twice a day, morning and afternoon, is recommended.
- During operation of the pump, the operator should stay at the pump house to monitor the operation.
- All accessories in pump house such as pressure gauge, water meter, check valve and gate valve are important as well as the pumping unit. If their performance seems to be abnormal, immediately cancel the operation and repair or replace them.

6.1 Regular Maintenance of Diesel Engine or Pump

Please see the attached instruction manual.

6.2 Daily Operation Procedure of Pumping Unit for Well

No	Procedure
Before Operation	
1	Open the door and all windows of pump house for sufficient ventilation.
2	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
3	Check lubricant oil of pump drive unit (head). If not enough, refill it.
4	Make sure the gate valve along pumping main is fully open.
Starting Diesel Engine	
5	Turn the key on engine panel to the right a little for preparation.
6	Turn the key on engine panel to the right fully (**On**) to start the engine.
7	Check the indicators on engine panel, such as battery, engine oil, temperature and fuel.
8	Wait for **10** minutes to warm up the engine.
9	Set the engine revolution speed at **1,450 (1.45 x 100)** rpm *1).
Starting Pump Operation	
10	Move the lever slowly to start operation of pump with rotation of the cardan shaft.
11	Monitor the pressure gauge until the pressure indicator rises and stabilizes at **11.5-12.0** bar *2), and make sure water flows with water meter's rotation.
12	Time the rotation speed of water meter to check the pumping rate, at **22-23** sec/rotation (100 lit/rotation).
Adjustment of pumping rate by engine revolution speed	
13	Monitor the engine revolution speed and rotation speed of water meter, to keep them at **1,450 (1.45 x 100)** rpm *1) and **22-23** sec/rotation (100 lit/rotation), with adjustment of the knob for the engine revolution speed (up for reducing or down for increasing rotation speed of water meter).
During Operation of Pump	
14	Monitor the conditions of diesel engine and pumping operation.
15	Check the indicators on engine panel, such as battery, engine oil, temperature and fuel.
16	Tighten the gland nuts of pump to prevent water leakage, but not too tight.
Stopping Pump Operation	
17	Move the lever slowly to stop pump operation, and make sure the cardan shaft stops completely.
Stopping Diesel Engine	
18	Wait for **10** minutes to cool the engine.
19	Turn the key on engine panel to the left (**Off**).
After stopping Diesel Engine	
20	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
21	Completely lock up the pump house.

*1) This set speed of 1,450 (1.45 x 100) rpm is not fixed permanently. In the future, when the pump becomes less efficient, the engine revolution speed may be need to be increased to keep the rotation speed of water meter at 22-23 sec/rotation.
*2) If water inside pumping main is flushed out due to maintenance work or other reasons, it may take time for the pressure indicator to rise and stabilize at 11.5-12.0 bar after starting the pump operation.

6.3 Daily Operation Procedure of Pumping Unit for Booster

No	Procedure
Before Operation	
1	Open the door and all windows of pump house for sufficient ventilation.
2	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
3	Check lubricant oil and grease of gear box and pump. If not enough, refill it.
4	Make sure the gate valve along pumping main is fully open.
Starting Diesel Engine	
5	Turn the key on engine panel to the right a little for preparation.
6	Turn the key on engine panel to the right fully (**On**) to start the engine.
7	Check the indicators on engine panel, such as battery, engine oil, temperature and fuel.
8	Wait for **10** minutes to warm up the engine.
9	Set the engine revolution speed at **1,670 (1.67 x 100)** rpm *1).
Starting Pump Operation	
10	Move the lever slowly to start operation of pump with rotation of the cardan shaft.
11	Monitor the pressure gauge until the pressure indicator rises and stabilizes at **17.5** bar *2), and make sure water flows with water meter's rotation.
12	Time the rotation speed of water meter to check the pumping rate, at **23-24** sec/rotation (100 lit/rotation).
Adjustment of pumping rate by engine revolution speed	
13	Monitor the engine revolution speed and rotation speed of water meter, to keep them at **1,670 (1.67 x 100)** rpm *1) and **23-24** sec/rotation (100 lit/rotation), with adjustment of the knob for engine revolution speed (up for reducing or down for increasing rotation speed of water meter)
During Operation of Pump	
14	Monitor the conditions of diesel engine and pumping operation.
15	Check the indicators on engine panel, such as battery, engine oil, temperature and fuel.
16	Tighten the gland nuts of pump to stem water leakage, but not tighten strongly.
Stopping Pump Operation	
17	Move the lever slowly to stop pump operation, and make sure the cardan shaft stops completely.
Stopping Diesel Engine	
18	Wait for **10** minutes to cool the engine.
19	Turn the key on engine panel to the left (**Off**).
After stopping Diesel Engine	
20	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
21	Completely lock up the pump house.

*1) This set speed of 1,670 (1.67 x 100) rpm is not fixed permanently. In the future, when the pump becomes less efficient, the engine revolution speed may need to be increased to keep the rotation speed of water meter at 23-24 sec/rotation.
*2) If water inside pumping main is flushed out due to maintenance work or other reasons, it may take time for the pressure indicator to rise and stabilize at 17.5 bar after starting the pump operation.

6.4 Photographs

Lubricant Oil of Pump Drive Unit (Head) for Well

Engine Panel (Revolution Speed Meter, Indicators)

Cardan Shaft of Pump for Well

Gear Box and Lever for Cardan Shaft of Pump for Booster

Gland Nuts of Pump for Well

Gland Nuts of Pump for Booster

Accessories at Well Pump House (from right: Pressure Gauge, Water Meter, Check Valve and Gate Valve)

Accessories at Booster Pump House (from right: Pressure Gauge, Water Meter, Check Valve and Gate Valve)

13.4 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Al Kharaba

Technical Operation and Maintenance Manual

for

Constructed Rural Water Supply Facilities

in

Al Kharaba, Bani Matar District
Sana'a Governorate

Prepared by JICA Study Team

0. Introduction

Groundwater is limited. However, it can be sustainable if you pump up and use water appropriately with consciousness on water resources conservation for the future, and also if water supply facilities are operated and maintained properly.

1. Community Information and Design Criteria

- Design Period : 10 years
- Growth Rate : 2.07%/year
- Present Population : 1,361 people @2006
- Design Population : 1,672 people @2016
- Unit Water Consumption : 40 lit/person/day
- Design Daily Consumption : 66.9 m^3/day

2. Summary of Facilities

Facility	Quantity	Remarks
Pump House and Pit with Pump Unit	1	Submersible Motor Pump and Generator
Ground Water Tank	1	50m^3
Pumping Main Pipeline	1,333m	3 inch
Distribution Main Pipeline	4,363m	3/4, 1, 1.5, 2, 2.5, 3 inch
Public Tapstands	13	For public use, school and mosques

3. Well Information and Capacity resulted from Pumping Test

- Well Bottom Depth : 150 m
- Casing Diameter : 8-5/8 inch
- Safe Yield : 3.5 lit/sec (210 lit/min, 12.6 m^3/hr)
- Static Water Level : 45.0 m
- Dynamic Water Level : 81.0 m
- Drawdown : 36.0 m

4. Pump Unit Information

	Pump	Engine Generator
Design Specification	Pumping Rate : 3.4 lit/sec Total Head : 217 m	-
Type	Submersible Motor Pump	-
Product & Model	Pump : Panelli/ 140PX13/24, Italy Motor : Franklin Electric, 236-613-9024 Direct-in-line Starting, 380V, 11.0kW (15.0HP), 50Hz	Model : Bruno/Ariete-G51P, 50(45)KVA, 400V, 50Hz@ 1,500rpm, COSFI/0.8 Engine : Perkins/UK, 1103A - 33TG1, 2502/1500 Alternator : Leroy Somer LSA 43.2S25
Serial No.	Pump : 121576	Engine : DK51278*U062565N*
Pump Install. Depth	96 m (Design/90 + Extra/6)	-
Column Pipe	Galvanized Steel, 3 inch, 6mL 16 pieces (Design/15 + Extra/1) *1)	-
Accessories	Gate Valve : Al Hababi, GVP/BS5163/PN16/3inch, Italy Check Valve : Al Hababi, GVP/BS5153/PN16/3inch, Italy Water Meter : Kent/PN16/DN80mm(3inch) Pressure Gauge : Empco/40bar	

*1) One piece of column pipe is kept by community as standby.

5. Actual Operational Information

- Static Water Level measured on 07/June/2007 : 45.8 m

Before Adjustment (gate valve opened fully)

- Reading of Pressure Gauge : 9.8 bar
- Pumping Rate : 5.0 lit/sec
- Assumed Dynamic Water Level : 96.0 m

After Adjustment (gate valve closed partially)

- Reading of Pressure Gauge : 16.0 bar
- Pumping Rate : 3.8 lit/sec *)
- Assumed Daily Pumping Hours : less than 4.9 hrs/day
- Assumed Dynamic Water Level : 84.5 m

*) The pumping rate after the adjustment is higher than the safe yield, but it is essentially not possible to close the gate valve any further since the pressure exceeds the specified working pressure of valves and water meter. However, any problems of water source should not occur if you control the pumping operation appropriately in accordance with this manual.

6. Practical Operation and Maintenance

6.0 Introduction

- Only the operator appointed by the community-based water committee is allowed to operate or maintain all facilities and equipment.
- All facilities and equipment should be kept clean and protected from vandalism.
- Only the necessary amount of water should be pumped up from the well.
- Water should not be wasted, and over-flow should be avoided.
- Daily pumping hours should be set and regulated according to the practical operation and actual consumption, but not more than approximately **5** hours per day.
- Operating the pump twice a day, morning and afternoon, is recommended.
- During operation of the pump, the operator should stay at the pump house to monitor the operation.
- Pump operation must be avoided during rain and thunder.
- All accessories in pump house such as pressure gauge, water meter, check valve and gate valve are important as well as the pumping unit. If their performance seems to be abnormal, immediately cancel the operation and repair or replace them.

6.1 Regular Maintenance of Engine Generator or Pump

Please see the attached instruction manual.

6.2 Daily Operational Procedure

No	Procedure
Before Operation	
1	Open the door and all windows of pump house for sufficient ventilation.
2	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
3	Make sure the gate valve along the pumping main is fully open.
Starting Engine Generator	
4	Turn the key on generator panel to the right a little, and hold it until green light goes on.
5	Turn the key on generator panel to the right fully (**On**) to start the engine.
6	Check the indicators on generator panel, such as battery, engine oil, temperature and fuel, and also the voltage (400V) and frequency (50Hz) meters.
7	Wait for **10** minutes to warm up the engine.
8	Switch the circuit breaker **up** on generator panel.
Starting Pump Operation	
9	Turn the red switch to the right (**On**) on pump control panel.
10	Check the voltage (400V) on pump control panel.
11	Press the **Green** button on pump control panel to start operation of pump.
12	Monitor the pressure gauge until the pressure indicator rises and stabilizes at **9.8** bar *1), and make sure water flows with water meter's rotation.
Adjustment of pumping rate by valve control	
13	Close the gate valve little by little while watching the pressure gauge until the pressure indicator rises to **16.0** bar.
14	Monitor the pressure gauge for more than 10 minutes to stabilize the pressure indicator at **16.0** bar with valve control (open it for reducing or shut it for increasing the pressure), and make sure water flows with water meter's rotation.
15	Time the rotation speed of water meter to check the pumping rate, at **26** sec/rotation (100 lit/rotation).
During Operation of Pump	
16	Monitor the conditions of generator (engine) and pumping operation.
17	Check the voltage (400V), frequency (50Hz) and the other indicators on generator panel, such as battery, engine oil, temperature and fuel.
18	Check the voltage (400V) of pump control panel.
Stopping Pump Operation	
19	Open the gate valve fully while watching the pressure gauge until the pressure indicator drops to **9.8** bar.
20	Press the **Red** button on pump control panel to stop operation of pump.
21	Turn the red switch to the left (**Off**) on pump control panel.
Stopping Engine Generator	
22	Switch the circuit breaker **down** on generator panel.
23	Wait for **10** minutes to cool the engine.
24	Turn the key on generator panel to the left fully (**Off**) to stop the engine.
After Operation	
25	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
26	Completely lock up the pump house.

*1) If water inside pumping main is flushed out due to maintenance work or other reasons, it may take time for the pressure indicator to rise and stabilize at 9.8 bar after starting the pump operation.

6.3 Photographs

Diesel Engine (Engine Oil)

Generator Panel (Green & Red Lights and Indicators)

Generator Panel (Ampere, Voltage and Frequency Meters)

Circuit Breaker (Up - On, Down - Off)

Pump Control Panel (Switch, On/Off Button, Meters)

Inside Control Panel (do NOT touch)

Accessories (from left: Pressure Gauge, Water Meter,
Check Valve and Gate Valve)

Gate Valve Adjustment
(Clockwise - Shut, Anti-clockwise - Open)

13.5 Technical Operation and Maintenance Manual for Constructed Rural Water Supply Facilities in Masneat Abdul Aziz

Technical Operation and Maintenance Manual

for

Constructed Rural Water Supply Facilities

in

Masneat Abdul Aziz, Mayfa'a District
Dhamar Governorate

Prepared by JICA Study Team

0. Introduction

Groundwater is limited. However, it can be sustainable if you pump up and use water appropriately with consciousness on water resources conservation for the future, and also if water supply facilities are operated and maintained properly.

1. Community Information and Design Criteria

- Design Period : 10 years
- Growth Rate : 3.04%/year
- Present Population : 406 people @2006
- Design Population : 549 people @2016
- Unit Water Consumption : 40 lit/person/day
- Design Daily Consumption : 24.5 m^3/day

2. Summary of Facilities

Facility	Quantity	Remarks
Pump House with Pumping Unit	1	Submersible Motor Pump and Generator
Ground Water Tank	1	25m^3
Pumping Main Pipeline	2,133m	3 inch
Distribution Main Pipeline	1,617m	3/4, 1, 1.5, 2, 2.5, 3 inch
Public Tapstands	2	For school and mosque only

3. Well Information and Capacity resulted from Pumping Test

- Well Bottom Depth : 268 m
- Casing Diameter : 8 inch
- Safe Yield : 4.5 lit/sec (270 lit/min, 16.2 m^3/hr)
- Static Water Level : 62.0 m
- Dynamic Water Level : 124.0 m
- Drawdown : 62.0 m

4. Pumping Unit Information

	Pump	Engine Generator
Design Specification	Pumping Rate : 3.0 lit/sec Total Head : 233 m	-
Type	Submersible Motor Pump	-
Product & Model	Pump : Panelli/140PX13/24, Italy Motor : Franklin Electric, 236-613-9024 Direct-in-line Starting, 380V, 11.0kW (15.0HP), 50Hz	Model : Bruno/Ariete-G51P, 50(45)KVA, 400V, 50Hz@ 1,500rpm, COSFI/0.8 Engine : Perkins/UK, 1103A - 33TG1, 2502/1500 Alternator : Leroy Somer LSA 43.2S25
Serial No.	Pump : 121574	Engine : DK51278*U062365N*
Pump Install. Depth	114 m (Design/114 + Extra/0)	-
Column Pipe	Galvanized Steel, 3 inch, 6mL 19 pieces (Design/19 + Extra/0) *1)	-
Accessories	Gate Valve : Al Hababi, GVP/BS5163/PN16/3inch, Italy Check Valve : Al Hababi, GVP/BS5153/PN16/3inch, Italy Water Meter : B-Meters/PN16/DN80mm(3inch), Italy Pressure Gauge : Empco/40bar	

*1) Two piece of column pipe is kept by community as standby.

5. Actual Operational Information

- Static Water Level measured on 03/June/2007 : 62.4 m

Before Adjustment (gate valve opened fully)

- Reading of Pressure Gauge : 10.5 bar
- Pumping Rate : 4.2 lit/sec
- Assumed Dynamic Water Level : 119.5 m

After Adjustment (gate valve closed partially)

- Reading of Pressure Gauge : 14.5 bar
- Pumping Rate : 3.1 lit/sec
- Assumed Daily Pumping Hours : less than 2.2 hrs/day
- Assumed Dynamic Water Level : 105.0 m

6. Daily Operational Maintenance

6.0 Introduction

- Only the operator appointed by the community-based water committee is allowed to operate or maintain all facilities and equipment.
- All facilities and equipment should be kept clean and protected from vandalism.
- Only the necessary amount of water should be pumped up from the well.
- Water should not be wasted, and over-flow should be avoided.
- Daily pumping hours should be set and regulated according to the practical operation and actual consumption, but not more than **2.2** hours per day.
- Operating the pump twice a day, morning and afternoon, is recommended.
- During operation of the pump, the operator should stay at the pump house to monitor the operation.
- Pump operation must be avoided during rain and thunder.
- All accessories in pump house such as pressure gauge, water meter, check valve and gate valve are important as well as the pumping unit. If their performance seems to be abnormal, immediately cancel the operation and repair or replace them.

6.1 Regular Maintenance of Engine Generator or Pump

Please see the attached instruction manual.

6.2 Daily Operation Procedure

No	Procedure
Before Operation	
1	Open the door and all windows of pump house for sufficient ventilation.
2	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
3	Make sure the gate valve along the pumping main is fully open.
Starting Engine Generator	
4	Turn the key on generator panel to the right a little, and hold it until green light goes on.
5	Turn the key on generator panel to the right fully (**On**) to start the engine.
6	Check the indicators on generator panel, such as battery, engine oil, temperature and fuel, and also the voltage (400V) and frequency (50Hz) meters.
7	Wait for **10** minutes to warm up the engine.
8	Switch the circuit breaker **up** on generator panel.
Starting Pump Operation	
9	Turn the red switch to the right (**On**) of the pump control panel.
10	Check the voltage (400V) on pump control panel.
11	Press the **Green** button on pump control panel to start operation of pump.
12	Monitor the pressure gauge until the pressure indicator rises and stabilizes at **10.5** bar, and make sure water flows with water meter's rotation.
Adjustment of pumping rate by valve control	
13	Close the gate valve little by little with while the pressure gauge until the pressure indicator rises to **14.5** bar.
14	Monitor the pressure gauge for more than 10 minutes to stabilize the pressure indicator at **14.5** bar with valve control (open it for reducing or shut it for increasing the pressure), and make sure water flows with water meter's rotation.
15	Time the rotation speed of water meter to check the pumping rate, at **32** sec/rotation (100 lit/rotation).
During Operation of Pump	
16	Monitor the conditions of generator (engine) and pumping operation.
17	Check the voltage (400V), frequency (50Hz) and the other indicators on generator panel, such as battery, engine oil, temperature and fuel.
18	Check the voltage (400V) on pump control panel.
Stopping Pump Operation	
19	Open the gate valve fully while watching the pressure gauge until the pressure indicator drops to **10.5** bar.
20	Press the **Red** button on pump control panel to stop operation of pump.
21	Turn the red switch to the left (**Off**) on pump control panel.
Stopping Engine Generator	
22	Switch the circuit breaker **down** on generator panel.
23	Wait for **10** minutes to cool the engine.
24	Turn the key of generator panel to the left fully (**Off**) to stop the engine.
After Operation	
25	Check lubricant oil, cooling water and fuel of the engine. If not enough, refill them.
26	Completely lock up the pump house.

*1) If water inside pumping main is flushed out due to maintenance work or other reasons, it may take time for the pressure indicator to rise and stabilize at 10.5 bar after starting the pump operation.

6.3 Photographs

Diesel Engine (Engine Oil)

Generator Panel (Green & Red Lights and Indicators)

Generator Panel (Ampere, Voltage and Frequency Meters)

Circuit Breaker (Up - On, Down - Off)

Pump Control Panel (Switch, On/Off Button, Meters)

Inside Control Panel (do NOT touch)

Accessories (from left: Pressure Gauge, Water Meter,
Check Valve and Gate Valve)

Gate Valve Adjustment
(Clockwise - Shut, Anti-clockwise - Open)

Republic of Yemen
Ministry of Water & Environment
General Water Authority for Rural Water Supply Project

Japan International Cooperation Agency "JICA"

Guidelines for Community Mobilization to establish Water Users Associations

Prepared by:

Abdulhamil Jamil

Introduction:

The current situation of rural development makes us turn around empty circle of wasting huge amount of money, which does not match the outputs, and results of the implemented projects.

The government policy has a lack in development progress towards the rural area such as the community participation in project implementation.

The GARWSP spend its efforts for each Yemeni rural projects equally but there is lack of community participation in planning and administration where the failure of implemented project can be observed due to social disputes on quality of managing the projects where the projects are controlled by dominants or effective group who do not have ability for operating, maintaining and managing the projects therefore the disputes and conflicts are occurred which result into human and natural abstraction of the project components.

Therefore, the citizen refers again to the concerned authorities for requesting new project that leads to the burden of government budget, which results into the disadvantage of other rural areas from getting the project.

For the continuity and sustainability of these projects, JICA has implemented three pilot projects such as:

Project Name and location	District	Governorate
Al Kharabah Water Scheme	Bani Matar	Sana'a
Jabal Al Taraf Water Scheme	Al Mahweet	Al Mahweet
Masneat Abdulaziz Water Scheme	Maifa'a	Dhamar

The projects are submitted carefully to the elected Community organization democratically represented by Water users Association where the formation of such committee has specific steps as electing the administrative authority, monitoring authority and building capacity for the WUA members (Administrative, monitoring board and project operation committee) in field of administration and Account processes.

The formation of WUA has specific stages before its establishment such as awareness, readiness and preparation for the community throughout interviews with encouragement and awareness team.

The agreement should be taken into consideration between the technical side and social side firstly for the development of any project to secure the quality of implementation, high speed and transparency with the benefited community.

Note:

This manual is prepared according to the fieldwork and is capable for improvement by any other concerned authority.

Instructions of social work for success of water projects

- The proper social study should be conducted to clarify the needs priorities of area for the water projects, on the other hand the need priorities should be identified by P.R.A tools.
- In case, the area is selected for implementing the project therefore the social work plan should be implemented firstly before the implementation of project technically which is called the social encouragement and preparation of the community, however this process takes specific period for the project implementation technically due to the importance of accessibility to the social change and improve the situation of the project area.
- After the establishment of the WUA, the capacity building should be done in the fields of administration, Account, maintenance, operating, Hygiene and environmental awareness for the administrative boards, monitoring, hygiene awareness and operating committee. The hygiene awareness committee should formed by women to train them due to their effective work in this field.
- After training and qualifying the committees, the financed agency should follow up and supervise the duties of operating project committee to check the work of committee at the beginning of water pumping to the houses, therefore the following up is considered as the security of continuity and success of the project.

Definitions of Social Terminologies used in this manual

1. **Social Motivation:**

It is defined as raising the information and knowledge for the targeted communities to identify their potentials and resources therefore mobilization and encouraging the community.

2. **Facilitation:**

This idiom contains of three sessions such as selection right, self-determining and organizing the community) and if these sessions are performed during the participation in the beginning of the project or program therefore the community can manage and facilitate its affairs methodologically.

3. **Water Users Group:**

It is informal organization on the level of one village and nearest villages or on well level or any water source. The WUG contains of specific number of farmers who use the same irrigation system in their agricultural activities and these farmers are considered as the targeted people by organizing the pumping water from the basin. The WUG has its independent geographical area and common objective, which is resulted to be homogeneous group.

4. **Water Users Association:**
It is a cooperative, volunteer and independent association, which cares about the water and environment problems within its area of activities and aims to develop, conserve, manage, safety consumption and saving the water resources.

5. **The Project Water Committee:**
It is a group of people, which is, formed democratically (Direct Free Election). The duties of the PWC are to manage the water project. The PWC is semi-formal organization where the deputy of local councils attends during the election and prepares a common report.

The process of mobilization and facilitation within the targeted community

The social mobilization should take place before the start of execution of the water scheme by at least one month and should continue during the project implementation until the end of the implementation phase.

Question: - How to initiate the social mobilization process and who is responsible for its implementation?

Answer: - the social mobilization process is initiated after forming the social team, which comprise of female and male hygiene accountable and social accountable, also the project engineers who have experience in the similar projects or the training should be given to them before the field visit.

The first stage of mobilization process is the initial visits, which are known as reconnaissance walk the targeted area and recognizing the social structures of the targeted community, after that the observations should be recorded and publish oral advertisement among the villagers about the stages on the establish of water user association to launch its activities where its task is to hand over, operating, maintaining the water project and protect the project's properties.

In additional, the team should know that it has objective deeper than WUA establishment, however this objective aims to search for kind of social movement and changes the people's opinions towards the self reliance and effective participation in performing the development within their communities.

The steps of launching the social work and establish of WUAs

The First step

Training the fieldwork team on fieldwork mechanism, meeting the communities and method of dealing with them effectively and seriously to facilitate the objective of WUA establishment that can be responsible for managing, operating and maintaining the project (this step needs at least 4 days for its implementation).

Second Step

After training step, the fieldwork team should visit the concerned project authorities such as (The branch of GARWP at the governorates level and the local councils at the districts level). The objective of this visit is to introduce the team to the concerned project authorities, also an advanced coordination with these authorities to identify the tasks of the team to the concerned authorities for obtaining the cooperation with the team (this step needs 1 – 2 days for its implementation).

Third Step

A. Visiting the targeted communities and inform them about starting the process of establishing WUA. This be via verbal announcement during the reconnaissance walk the residential sub-villages.
B. Each sub-village should be visited after reconnaissance walk to conduct awareness interviews and taking the villagers' impressions about the idea of WUA establishment to mobilize them on rapid formation of Preparation committee, (this point needs 3 – 4 days for its implementation).
   (this step needs 3 – 4 days for its implementation)

Fourth step

A. Forming the Preparation committee by community participation with preparing records followed by signatures of minimum 41 founders and write application to the office of social affairs and work to complete the initial procedures.

B. Conduct training workshop for the Preparation committee and community leaders about preparing essential system and subjects on participatory leadership and the importance of self reliance on managing the project and the methods of selection for administrative board members, monitoring committee and inspection committee.

C. Mobilization the Preparation committee on submitting file of the required priorities to the social affairs office to complete the advertising procedures to hold established conference for the committee (this step needs 5 to 6 days for its implementation)

Fifth Step

Raising awareness and health & environmental education for males and females separately and focus on diseases related to the polluted water to give their opinions about the benefit of accessing clean water to the houses (this step needs 3 days due to large number of population).

Sixth Step

Following up the announcement procedures to hold established conference and electing administrative board and monitoring & inspection committee based on the rules and regulations of social affairs office.

Seventh Step

A. Forming the hygiene awareness committee that contains of teachers, mosques' preachers and effective villagers.
B. Conducting training course about hygiene and environmental awareness for men.
C. Forming females hygiene awareness committee and train them

(This step needs 5 days for its implementation)

Eighth Step

A. Attending the established conference and electing administrative board and monitoring & inspection committee.
B. The coordination should be done with concerned project authorities about the time and venue of workshop.
C. Conducting training course on administrative and account field for the administrative board, monitoring & inspection committee and project operation committee.

(This step needs 6 to 7 days for its implementation)

Ninth Step

A. Conducting workshop for decision makers of related authority and administrative board, monitoring & inspection committee to exchange the opinions, suggestions and recommendations about managing, maintaining and operating the project by Water Users Association.
B. Conducting a possible practical visit to successful project that can be identified.

(This step needs 3 days for its implementation)

Social contents on mobilization and facilitation process

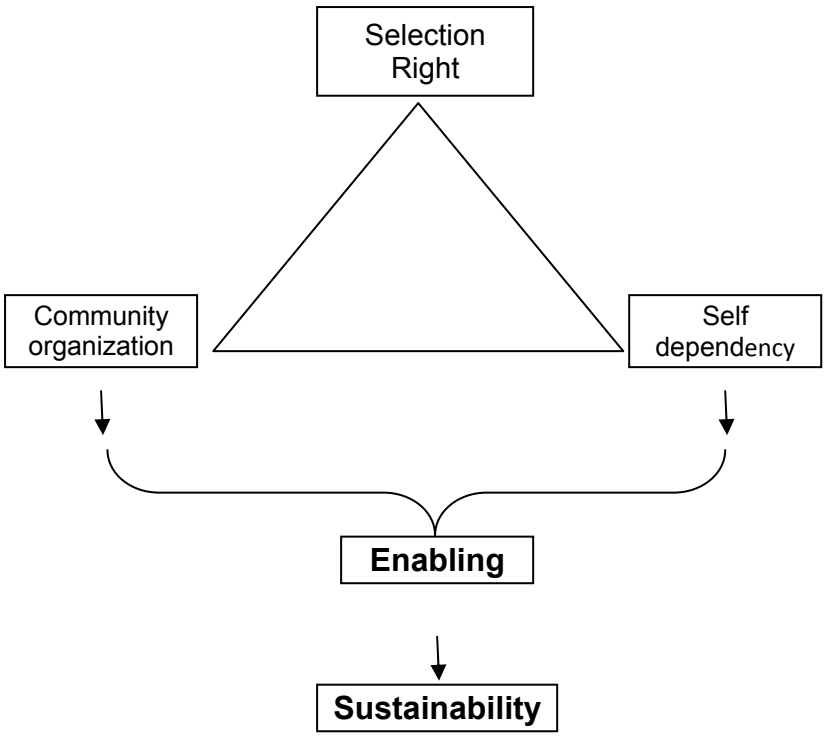
When we want to mobilize the community, then we should follow the past references of parents and antecedent about the ways of cooperation among each other to repair what was destroyed by the heavy rainfall or by any natural disaster, however the cooperation was called as Al Jaiyash, Al Faza'a, Al Al Gharm etc. The Yemen communities are cooperative, solidarities and initiative naturally that can proved by appearance of the National cooperative authorities for development in the middle of 1970 where the community was playing important role in projects implementation such as roads and schools projects.

The cooperation, customs and social traditions were started according to the cooperative and voluntary work concept in order to serve the area. These kind of methodologies were started to be decreased and disappeared because of the economical situations and oil revolution in Arab Gulf and Arab island which lead to the immigration of some Yemenis to these countries for getting job opportunities and then increasing the income of these households which lead to the appearance of selfishness and discriminating between the poor and rich people which cause to leave the leave the agricultural activities and attempting to immigrate for gaining higher income rapidly. In addition, Yemen gets international donations for constructing and implementing several of projects directly without a community participation in such kind of projects.

The huge experiences, resources and potentialities lead to reduce the activities of cooperative NGOs and community participation directly therefore, the community relies on others.

This situation led to think about new approaches for implementing the project to ensure project continuity and sustainability. In order to promote community participation, it is necessary to mobilize them to enable them to manage the projects. Enabling communities to manage their projects requires capacity building and organizing the local communities by upgrading their skills and increasing their knowledge in order to ensure self reliance.

The following schematic diagram illustrates how enabling the community can take place:



There are three elements for "Enabling" that can be observed from the above diagram which are:

1. Selection right: this means the community defines its needs and priorities
2. Self-reliance: this element is important and it can be achieved by intensive and continuous training for the social committees.
3. Community Organization: this element can be achieved through forming the development committees and cooperative associations related to handle the agricultural projects or drinking water projects.

The ability access can be achieved through the abovementioned elements to gain the continuity and sustainability of projects.

Steps in Enabling the Community through Social Mobilization

First Phase:

Predisposition and preparation:
The mobilization team should know the objective of promotion process and keep their opinions that the objective does not aim only the establishment of WUA for project management but it aims also to activate and strengthen communities to rely on themselves using available resources.

The mobilization team should be familiar with community natures and arrangements through the subsidiary sources, primary visits and passing interviews with villagers to note the observations about the community leaders, effective people and the impact education assessment on the community.

The skills and characteristics required for members of the mobilization team

1. Strong communication and listening skills and ability to persuade others
2. Managing the meeting and facilitating discussion
3. Modesty, respect, patience and care about others
4. Ability to organize communities
5. Ability to make convincing arguments
6. Ability to analyze ideas and to write reports and to document the process

Such kinds of skills are very important for the mobilization team member and should be existing for self-persuasion; if the member does not have these skills, therefore he should leave the assignment to other people who have these skills.

Second Phase

Awareness and affection:
The team should illustrate that the aim of the visit is to assist and direct the villagers in order to identify their problems and work towards solving them in order to improve their situation independently. The team should use phrases from the Holy Quran to demonstrate the importance of community participation and self reliance. Some of these phrases are highlighted below:

قال تعالى (وهزي إليك بجذع النخلة تساقط عليك رطباً جنيا) سورة مريم. ماهي الحكمة الإلهية من عدم إرسال رياح تسقط التمر من على النخلة في حين أن السيدة مريم عليها السلام في حالة مخاض.
وقال تعالى (قالوا يا ذا القرنين إن يأجوج ومأجوج مفسدون في الأرض فهل نجعل لك خرجاً على أن تجعل بيننا وبينهم ردما. قال ائتوني زبر الحديد حتى إذا ساوى بين الصدفين قال انفخوا حتى إذا جعله نارا قال ائتوني افرغ علية قطرا) سورة الكهف. هذه الآية توضح عندما طلب من ذو القرنين عمل سد يفصل بين المجتمع الذي طلب وبين يأجوج ومأجوج فنلاحظ أن المجتمع قد قام بالنفخ والحفر والردم وهذا عمل عضلي إضافة إلى أن المجتمع قدم المواد الخام (زبر الحديد والفضة المسالة) أما الخبرات في إتمام هذا السد فكانت من خارج المجتمع ومع هذا تم تقديم هذه الخبرات بشكل تدريب ومشاركة المجتمع حتى يستفيد المجتمع ويعتمد على ذاته مستقبلا.
ومن القصص أيام الرسول عليه الصلاة والسلام قصة الرجل الذي طلب مالاً من رسول الله عليه الصلاة والسلام لشراء الطعام فقال له رسول الله خذ هذا الحبل واذهب إلى الجبل واحضر حطبا وبيعه في السوق، أو كما قال رسول الله. يمكن ضرب مثال على توحد المجتمع بكل فيأته من اجل مصلحته بقصة الحكيم والأبناء والعصي يمكن تطبيق هذه القصة مع الأهالي كلعب ادوار .

After reading these phrases from the Holy Quran, the team should stimulate discussion with the community of they have any similar examples that illustrate the importance for the community to take initiatives and to cooperate and participate in the implementation of the water scheme. At this stage, community members begin to realize and value participation and they confirm their willingness to participate in project implementation.

The team should then point out the need for a unified and cooperative community where all its members have equal rights, and that all men and women, sheikh and citizens, literates and non literates are altogether the basis for any successful development.

The Social Mobilization Team should not take sides towards any community member at the expense of others whether that person is a sheikh or an influential person. There should be a balance in meetings that takes place with whom? and where? at the level of targeted sub-villages. The team should point out that any bias leads to weakening the community work and failure of projects.

An example could be given to illustrate the strength of a unified community in all its segments need for importance of using the given

Third Phase

Community mobilization:

The mobilization team will observe that the communities has become able to manage the meetings and consulting among them without interference of the team, therefore the community mobilization indicates that the promotion starts earning its outcomes through meeting and communicating with the mobilization team to inform the team about the results of meetings, discussions and formation of committees or representative for each group of the community in order to secure the participation for all people, however in this phase the hygiene awareness committees are formed through several phases of establishing the WUA's according to the regulations of social affairs office.

The capacity building should be achieved for the following structures:

- The administrative board,
- The monitoring & inspection committee
- The men and women hygiene & environmental awareness Committee

Attachments

1- Training materials in management to build the capacity of the Administrative Board and Monitoring & Inspection Committee
2- Manual of Hygiene & Environmental Awareness

The contents of training subject

Note:

The trainer should possess the information about the tools and methods of training.

Development concepts

1- **Sustainability:** it depends on self-resources of the community where the community participates in planning, implementation and management. This concept is mostly successful.

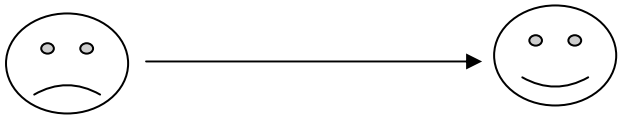
2- **Participatory leadership:** it is a process of a common social interaction among the community members and this concept is the most successful method of leadership where a group issues the decision, which is deliberated and acceptable properly for its implementation by all members.

3- **Resources:** it is defined as a self-wealth that exists within the community that leads to create development opportunities in case of using it properly by the community. Such kind of resources are as follow:
   - Human resources such as people and lore.
   - Natural resource such as land, water, trees and agriculture.
   - Social resources such as social organization customs and traditions.

4- **Top down development:** it is planned and implemented directly without the local community participation. This development can be terminated if there is no financial support by this program.

5- **Bottom up "grassroots" development:** it is planned and managed by the efforts of the local communities or by relativity assistance from outside of the community. This development proves its success and sustainability.

Development is a process of changing from an undesired state to a better state.



4. Communication

Definition:

The conveying messages can be explained for the respondent properly.

Elements of communication

1- Sender
2- Receiver
3- Message

Types of communication

1- **Verbal communication:** this is done through words and phonations. Effective oral communication depends on the language used and the clarity of the sound.
2- **nonverbal communication:** it does not depend on words and phonations and it is done by two methods such as:
   - **Body language:** for example (facial expression – eyes and hands movement).
   - **Symbolical communication:** such using the external show and place related to the access of behavior and feelings to the receiver such as using hair, beard, tattoo and clothes.

In fact, the verbal and non verbal communication is used in life among the people without any limitations but each one assists other to address the purpose. We always focus on oral communication without focusing on un oral communication. The administrative board and monitoring& inspection committee should build a continuous touch with a public Association in order to exchange of suggestions, experiences and information accessibility by community leaders to villagers properly. This communication source leads to conducting meeting successfully.

5. Meeting management

The most critical constrains related to the meetings

1- The fear of wasting time by the participants.
2- Conducting meeting is known as chance of neglect.
3- The meetings do not achieve their expected outputs.
4- Diverting away from the subject of discussion
5- Not sticking to start and end time of the meeting
6- The presence of people who are invited and are not related to the subject

How to organize and facilitate a successful meeting

The following procedure should be carried out to ensure successful meetings:

Before the meeting: In this phase, someone should be assigned the responsibility of notifying the persons who are expected to participate in the meeting. The notification should include:

- The purpose of the meeting
- Date and place of the meeting
- The period of the meeting, the starting and ending time of the meeting

During the meeting: At the start of the meeting, there should be divisions of roles and responsibilities as follows:

- **The chairperson**: Responsible for opening the meeting and clarifies the aim of the meeting, and introduces the facilitator, the time keeper and the note-taker
- **The facilitator**: Responsible for the facilitation of discussions in an impartial way and makes sure that the discussions in moving in the right direction
- **Note-taker**: Documents the deliberations of the meeting and present a summary of the discussions at the end of the meeting.
- **Time keeper**: responsible for making sure that the time is adhered and remind participants of the time for each sessions
- **Participants:** they discuss the issues which are on the agenda and give their opinion

During the meeting: the following issues should be adhered to as much as possible:

- The discussion should focus on one issue and the meeting should end up with agreed solutions.
- the facilitator should ensure that all participants have equal opportunities to express their opinions
- Agreeing on specific points before moving to the next issues
- The time keeper should make sure that the participants stick to the time
- Agreeing on the points that need follow up, who should do it, where, how and when
- At the end of the meeting the participants should sign on the minutes before leaving
- Agreeing among participants on the dates, time and place of the next meeting

After the meeting: the following points should be done to provide continuity

- Distributing the minutes of meetings and archive one copy for future records
- Follow up the implementation of points agreed during the meetings

Leadership

It is the ability to influence the behavior of individuals and groups and to coordinate between them in order to achieve the desired objective.

What is the Role of the Leader?

1- work to maintain the individuals and groups
2- continuously adapt to the changing circumstances around him
3- work to develop working methods to achieve the desired situation
4- resolve conflicts and address the differences that arise between individuals and groups

Types of leadership:

1- Dictating leadership
2- Participatory leadership

Who is the effective leader?

The effective leader is the one that can adapt to the needs of leadership according to the situation.

As maybe necessary the effective leader may take a swift action during crisis and can have obeyed by his followers without being questioned. As soon as the crisis is over (s)he can deal with group members in a democratic and participatory way. Therefore, the administrative leader faces huge challenges because (s)he is responsible for the management of human resources in order to attain a prosperous life.

Characteristics of the successful leader

(S)he has the ability to train and influence others
(S)he the ability to communicate with others leader
(S)he is trusted by others and have the ability to trust others
(S)he has the courage or the guts to take difficult decisions when necessary
(S)he has strong intuition and instinct
(S)he gives priority to the interests of the groups as opposed to his own interest
(S)he is familiar and experienced in managing groups
(S)he modest and can easily be approached by group members
(S)he has the trust in God in all his endeavors

Decision making

The decision is the choice taken by a person in his personal live or as a leader in a group or as a manager in an association. Such decision should be taken after analyzing and evaluating the alternative options carefully because the judgment will have consequences on the persons who takes such decision, but can also have an impact on the group affected by such decision.

Steps in decision making

1- **Identify and define the problem**: Identifying and specifying the real (root) problem and not the signs and the effects. This takes place by analyzing the problem using the "Problem Tree Technique"

2- **Specify the alternatives**: This can be done through brainstorming and discussing ideas in order to reach the best alternative

3- **Assess the various alternative**: by identifying the strong and weaknesses for each option separately.

4- **Selection of the best option:** This is done by differentiating between strength and weaknesses for each option. Once this is done the best option selected is the one that has more strength and less weaknesses

Criteria that should be taken into account when making decisions

معايير يتم الأخذ بها في الاعتبار عند اتخاذ القرار

1- the decision should be accepted by all group members

2- the decision should not contradict with the interest of the public and the community

3- The arising risks which resulted from the decision should be minimal

4- the possibility of implementing the decision is high

Documentation

Documentation is one of the key pillars for any organized work, and it is one of the prioritized tasks in management because of its direct link for other management operations. The rationale for documentation is explained by the fact that the invoices and bills which are documented becomes part of the important reference that demonstrate the credibility of the Water Users Association within its community, donor agencies and other associations. Moreover the documentation can be used as a reference or evidence in any disputes if it ever occurred.

Types of documents

1- financial documents related to money and accounts
2- administrative documents related to administrative affairs
3- financial and administrative documents

Forms of documentation

1- copybooks
   - copybook for the minutes of meetings
   - administrative copybooks
   - financial copybooks
   - any other copybooks endorsed by the association

2- files
   - a file for bills
   - a file for the outgoing correspondence
   - a file for the incoming correspondence
   - a file for the management board
   - a file for the payment invoices
   - any other files endorsed by the association

3- registers: They contain specific data on the documents available in the association

Monitoring:

Monitoring is the regular assessment of data to ensure that activities are on track according to plan.

The importance of monitoring:

1- Monitoring can help in accomplishing activities according to plans

2- Any deviation in implementation from what has been planned can be redressed before it is too late

3- Monitoring can be used as a tool for measuring staff performance

4- Monitoring can be used to review data and information

Activities for monitoring should be carried out in a participatory manner to ensure effectiveness and to foster a sense of ownership.

Self evaluation of the activities of the association:

This can be done using clear indicators such as:

1- Delay in payments by subscribers and high debts

2- Interruptions of supplies faced by households

3- The bank account balance is low

The abovementioned indicators (including other indicators which the association feels they are important) enable us to carry out a rapid assessment to identify problems and defects, and to identify prompt solutions to redress them.

Some of the indicators may be phrased in a positive way such as: bills are paid regularly, the bank account balance of the association is high, an increased in the level of awareness). These indicators point out to the success of the management of the WUA.

The monitoring function

The Concept of Monitoring

Monitoring is the supervision of the a group or a committee aiming to check that the work is progressing according to the plans and in line with the rules and regulations of the association.

The types of monitoring

Monitoring before implementation: as the term implies, this is done before implementing the activities which can pinpoint and redress any problems before implementation.

Monitoring parallel to implementation: such monitoring can discover any deviations during implementation

Monitoring after implementation: such monitoring is done in order to:

1- Measure progress and assess performance after implementation
2- Redress the deviations
3- Improve current performance

Question: How can the Monitoring Committee measure achievement?

For quantitative achievements, this can be done by asking: how much is the annual revenue of the WUA from the water scheme?

For qualitative achievements, this can be done by asking: what is the level of performance of the staff in the Management Board and in the Operation Committee?

The Monitoring Committee plays a key role in monitoring activities to ensure that they are in line with the internal regulations, and they give advice and recommendations on how to redress deviations. Hence, there should joint regular meetings between Management Board and Monitoring Committee. During these meetings, the Monitoring Committee could give feedback to the Management Boards in a positive way that serves the best interest of the association.

The Problem

Definition

It is a statement of undesired situation affecting a group of people in a specified location at a particular time.

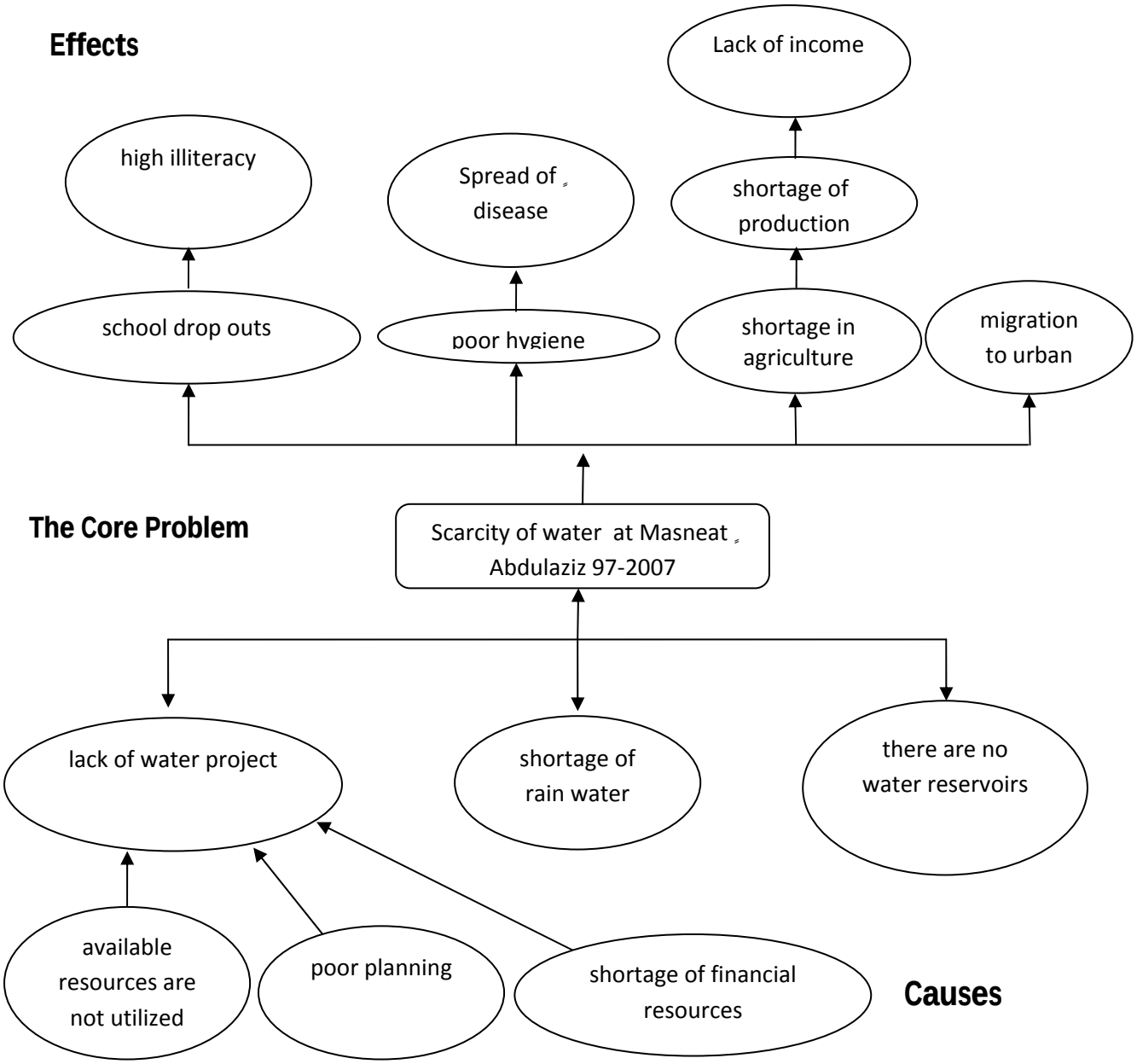
1- The problem is not due to the absence of a situation, but it is rather the existence of undesired situation. Examples of the correct and the incorrect problem statements
   a. there is not agricultural insecticides (incorrect problem statement, this is an absent solution)
   b. the crops are affected by insects (this is a correct problem statement)

How to define the problem?

The following table can be used to define the problem:

- Who? - Where? - When?	- What? - Why?	evidence of the existence of the problem	The what?
- who are affected by the problem? - Where do they live? when did the problem arose?	- What is the problem - Why did the problem occur?	What evidence or signs are there for the existence of the problem?	What are the consequences of not solving the problem?

Example of the analysis of Problem Tree

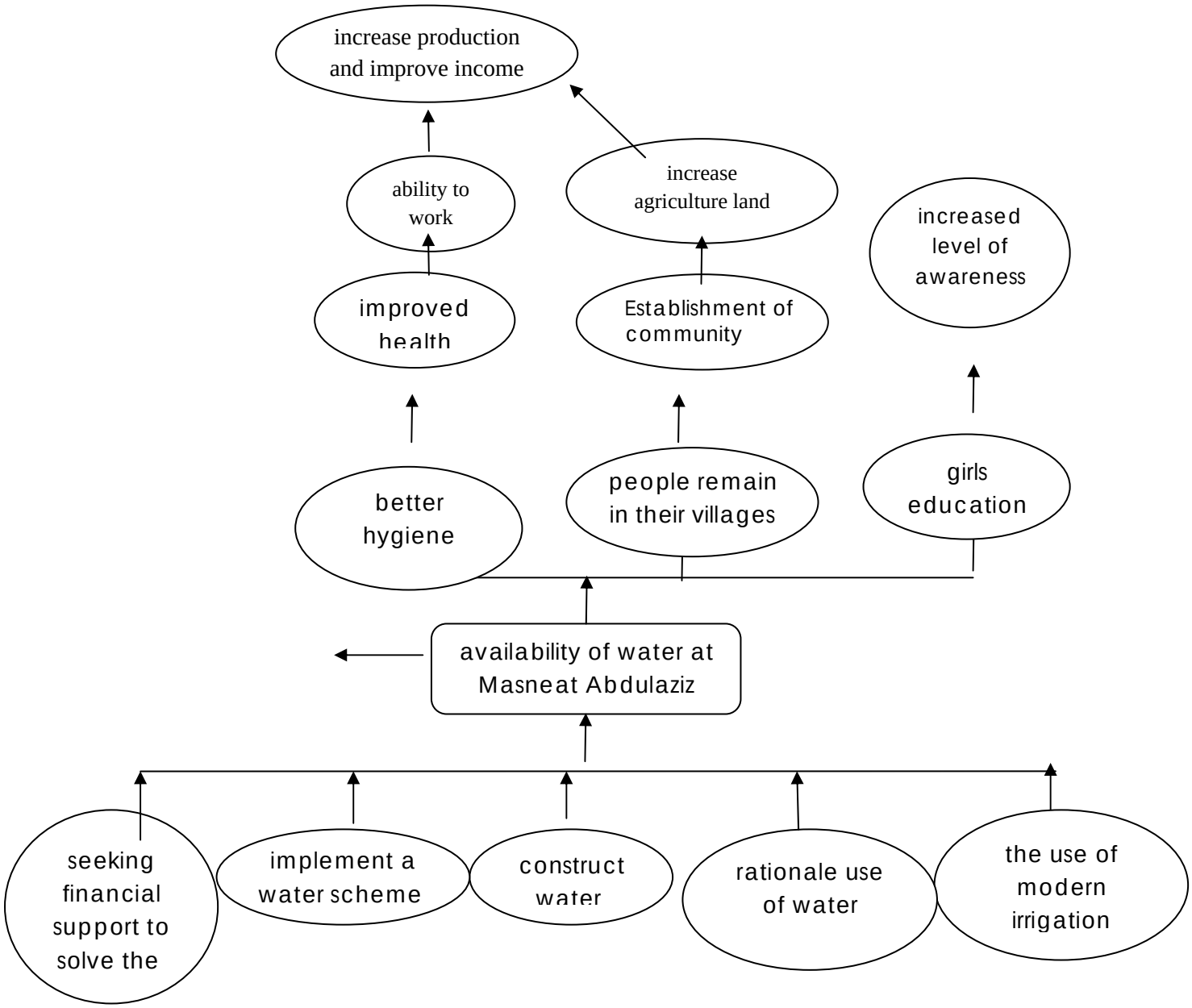


So to analyze the problems using the problem tree we have to follow the following steps:

1- define the core problem
2- start with the root causes
3- effects of the problems

Analysis of the Objective Tree

This is important in order to identify solutions and opportunities and to define the objective



Example of the analysis of the Objectve Tree

Positive effects

Steps in the analysis of the Objective Tree

1- stating one objective to solve the core problem
2- clarifying the opportunities and solutions, and the activities that will contribute to achieve the objective
3- clarifying the effects and the positive results from achieving the objective

Developing a work plan

The plan should be developed and implemented in a participatory way. The following schematic diagrams clarify this point

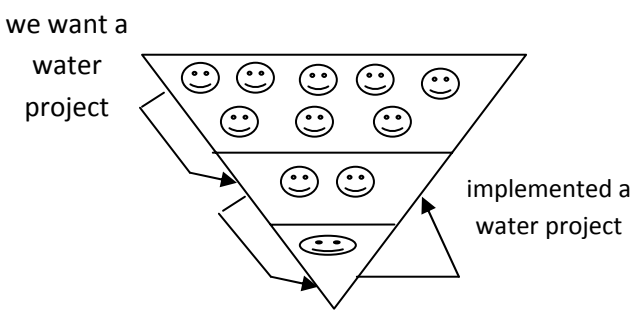


diagram 1

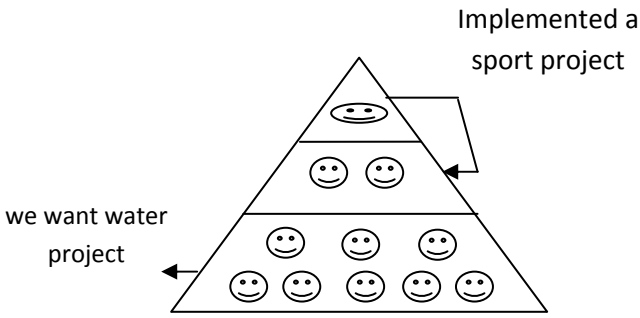


diagram 2

Diagram 1 shows the planning starts at grassroots through community participation, so the planning is according to the community needs, while the second diagram shows the planning from above which does not usually conform to community needs.

An example of developing a work plan:

We can develop the plan very easily by looking at the objective tree which can reflect in a plan as shown in the following table.

Objectives	activities	time frame	responsibility
To solve the scarcity of water in Masneat Abdul Aziz	Awareness raising on the rational use of water	1st July to 2nd Sep 2007	Ziad Al-Masnay
	Replacing the old piped water with a new one	1st July 2007 – 1st Feb 2008	Sheik Naser
	Follow up to get the water scheme	-2007/7/1 م2007/10/1	Ahmed Ali Al Garady

"In the Name of God, Most Gracious, Most Merciful."

Manual
on
Health Education and
Environmental Awareness
for Water User Associations

Index

Introduction:

In view of the importance of water in our daily life and its direct relation to the health of the human being, who is considered as the backbone and the base of development, the JICA Study Team was keen to introduce the concept of health education and environmental awareness to those who benefit from the executed pilot projects in Al-Kharaba in Sana'a governorate, Masneat Abdul Aziz in Dahmar governorate and Jabal Al Taraf in Al Mahweet governorate.
The complete job was assigned to Interaction for Development company through its consultants, who are specialized in organizing and executing social works.
The target for the Social Mobilization Team was to develop the cleansing behaviors and the usage of water by the citizens.
What is the use of executing a water project in order to make clean water reach the houses and then taken by citizens in polluted and unclean glasses.

Amongst the evidences studied by us, the evidence of health education and environmental awareness for water and sanitary drainage is mostly to be taken with some modifications in addition to the pictures belonging to Interaction that help in treating the wrong sanitary conducts.

The following Activities were performed to carry out the education program:

- Carrying out collective education with concentration on women being most connected to water, housework and raising up children.
- Individual visits to every Locality where collective education was given to men and women.
- The establishment of an educational committee at the level of the beneficiaries with consideration to make all Localities represented in it during the elections.
- Training the established committee by making use of the Manual for Health Education and the pictures of Interaction showing the good and wrong conducts (the PHAST Method).
- Laying down an executive plan for Health Education using the participation method.

<u>Objectives of Health and Environmental Education:</u>

General objective:
To raise the social and health level of the people in matters related to the use of water and how to make the best use of it in order to make them a very effective tool in the fields of comprehensive development.

Special objectives:

1. Providing health protection and raising the health level of the inhabitants.
2. Providing comfort means and tranquility to residential assemblies.
3. Increasing the awareness of people toward their conducts in the targeted areas. Make people aware to commit themselves to individual cleanness and not to waste the water.

Health and Environmental Education Committee:

It is a group of persons entrusted to carry out the health and environment education in one area.

Importance of health and environmental education in rural water projects.

1- There are many wrong conducts related to the use of water and to the sewage system.
2- Risks and damages of wrong use of water.
3- Contaminated water is considered the major means of transmitting many parasite and viral diseases to humans and animals.
4- Health and social disasters can occur because of an epidemic in the area of the project, which may result in loosing many human and animal lives.
5- There are many habitual bad habits and traditions related to the use of water which need to be altered or abandoned by intensive education.

The Educators:

Education is the task to be done by all the beneficiaries at all levels and sexes. They must feel its importance because it is the safety valve that protects them from much harm that may occur to them, their people and their local environment. They must also feel its overstated importance to the working of the project in a useful and harmless manner, and in order to organize the job and make it more professional; the education committee must be constituted of more active and effective persons who are also known for society services, such as:

1. Resident society teachers.
2. Schools social counselors .
3. Mosques speakers.(Friday Imams)
4. Dignitaries and persons of distinction in the society.
5. Women, specially the educated ones and those working in the health sector.
6. Those who are working in the health utilities of the project.

Qualification of the educator:

1. The spirit of voluntary work motivated by love of good for the people, and sense of responsibility before God and the society.
2. To work hard for the good of the public and to serve the region.
3. The capacity to be flexible when dealing with others, tolerant and must have no room for desperation or frustration.
4. The good capacity to grasp the subject matter he learns, and the willingness to pass it to others.
5. Should have an accepted style by the ordinary citizen when passing the massage in conformity with the prevailing norms and traditions.
6. Should use quotations from the holy Quran and the Sonnah (Hadith).

Setting up Health Education & Environmental Awareness Committees:
Those committees should be at two levels as follows:

1- Basic level:

Selection of members representing the educational side from the Administrative Committee of the Beneficiaries Society. He will be responsible for setting up committees in rural levels.

2- Rural levels:

An educational committee must be set up in each village and in number of villages if possible. Each committee must be consist of two to three persons .The tasks of education in their villages must be carried out under the supervision of the Society. It is recommended to include women in the educational committees because they represent 95% of the water users.

3- Educational committee in the school:

Each school which falls within the scope of the Project must set up an educational committee from the school headmaster, the teacher in charge of activities and the social specialist, or any other teacher who is social-minded in coordination with the person responsible for health education in the Society

Tasks for the Health and Environmental Committees:

These tasks are limited to giving guidance and education in health and environmental aspects related to the best ways of using and saving water, how to maintain its sources, methods of correct sewage draining systems, and how to tackle related problems that might come up.

Means used in the process of health and environmental education:

(1) Individual contacts:

- Home calls: Lectures, seminars, discussions, dialogues, mental storming and playing roles.
- Environmental visits: Cleaning campaigns and following up the general cleaning of the area .

(2) Collective activities such as:

- Lectures and interviews.
- Discussions with small groups.
- Illustrative demonstrations.
- Scholastic activities and trips .

(3) Collective communicating method:

- Posters, slogans and signboards.
- Bulletins.
- Mass Media.

(4) Public occasions, such as:

- Wedding parties.
- Memorial gathering.
- Birthdays.
- Holidays and other social occasions.

First: Importance of Water and its Relation to Public Health

Generally speaking water has great importance in the daily living of humans and every living creature because of its necessity to live and its continuation. No living thing can survive without water .God said "*And from water we made every living thing*". Water must necessarily be safe and clean in order to serve its natural purpose inside the body, by either drinking it or using it for preparing food and cooking; or out side it for washing, bathing and cleaning clothes.

1- Usefulness of healthy clean water:

- Drinking clean water free from germs and dirt keeps us away from many infectious diseases that are transmitted through water and keeps our bodies safe.

A person drinking clean water

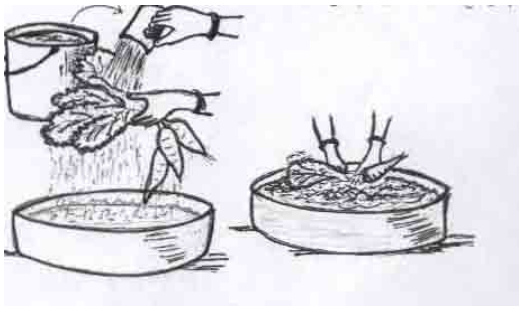
- Dirt causes diseases: if you wash your body and your clothes with soap and clean water, all germs and dirt will disappear.

This person does not care for the cleanness of his body and his clothes

This person cares for the cleanness of his body and his clothes

- Our foods, especially the vegetables and fruits, are polluted with germs and dusts. Therefore washing them in clean water prevents germs from entering our bodies.

Clean washing water



Washing vegetables and fruits

- Washing kitchen utensils prevents food pollution and helps us to take clean food free from germs.

Washing utensils

washed utensils are put upside down for drying

washing water for animal drinking

dirty dishes

soap in water

Remember: If members of your society become aware of the health usefulness of pure water; they will care to keep it. Keep reminding them to maintain the importance of using clean water for personal use and for cleaning tinsels and clothes.

Summary: Clean water keeps you and your family in good health and makes you more efficient to work and earn your living, thus sparing you the coasts of medicines and medical treatments.

How can we know if the water is safe and clean?

The following conditions must be available to provide drinkable, safe and clean water:

1. Water should be clean without any taste, color, or smell.
2. Acceptable taste.
3. Free of organic matters, which pollute the food like wastes, leftovers and stool.
4. Free of germs and Pathogenic.

Note:

Water is sometimes found clean with acceptable taste, no color or smell, but yet it contains Pathogenic germs which cannot be seen by the naked eye due to their tiny sizes.

2- Hazards of polluted water and its role in transferring diseases

Water is considered polluted and hazardous if found in the following forms:

- Troubled and polluted
- Stinking with unacceptable taste.
- Containing organic matters, parasites and germs although it looks clean sometimes.

Major causes of pollution:

- Human leftovers (urine, stool, spits, used water)
- Food remnants, dry leftovers and oils.
- Animal leftovers, fertilizers, germicides used in agriculture

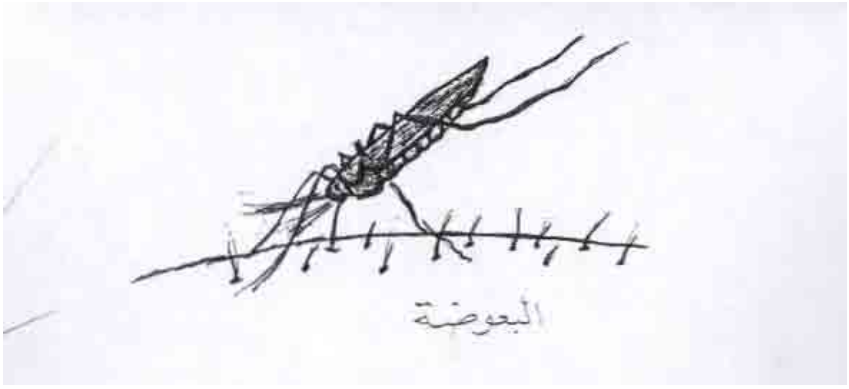
Second: Water Related Diseases:

Malaria Disease

- Malaria is an infectious disease caused by tiny parasites in the human blood.
- Malaria infects children and grown ups as well. Moderate atmosphere temperatures help spreading the disease.

How is Malaria transmitted from a person to another?

- Malaria is caused by a mosquito bite. Mosquitoes live in water and feed on human blood.
- When a mosquito bites an infected person, it takes parasites from his blood and injects them into a healthy person.



Symptoms of Malaria:
An infected person feels the following:

- Shivering and trembling.
- Fever and headache.
- Severe sweating.

These symptoms can disappear for a short time, but they will recur.
Seriousness of the disease:
If the disease is not treated promptly, it might lead to:

- Blood Anemia and loss of weight.
- General weakness and inability to work.
- Coma and brain Encephalitis.
- Ultimate death.

Precautionary and preventive measures:
If there is a local spread of malaria in your area, you must ask your people to rush for:

1. Medical treatment:
    - When you notice a person suffering of the above symptoms (sweating, shivering and fever), advise him

and his family to go to the health clinic for medical chick ups and to receive the medication.

- Follow up the patient and make sure he takes this medication as instructed by the physician.
- Families and society seniors that an infected person can spread the disease amongst all members of the community.

2. Prevention of the disease:

- Remind all members of your community (seniors, children, elders) that mosquitoes which transfer the disease live in rainwater which accumulates in pools, ditches, used canes, uncovered water tanks, broken flasks and old tires. Ask them to search for the places of reproduction of mosquitoes and eliminate them. They can,
  for example do the following
- Keeping water in covered containers. Uncovered containers must be made empty every 2 or 3 days.
- If old cans and broken flasks are found; ask people to collect and bury them.
- Old tires can be punched to prevent accumulation of water inside them.
- Make sure that the water used for domestic purposes is not accumulated in open ditches close to houses.
- Fill up with earth all water accumulation places, which humans do not need, or pour oil on them to kill mosquito's larva.

Remind your community members that if mosquitoes are found, then water accumulated in places like open ditches, uncovered flasks, tires, or cans etc. becomes dangerous to health

3. Preventing mosquitoes from reaching people:

Advise people to protect themselves and their children from mosquitoes' bites by:

- Providing all windows with reticulated nets.
- Sleeping under mosquito nets, especially children.
- Eliminating of mosquitoes from your houses by all possible means including the use of germicides.

All citizens must be protected against mosquito bites because mosquitoes transmit Malaria disease from an infected person to a healthy one**.**

Summary:

The prevention of Malaria requires the education of the community on the following:

- Treatment of Patients
- Elimination of the mosquito's concentration places.
- Stopping mosquitoes from reaching people.

The Bilharzias disease:

It is an infectious epidemic disease in many Yemeni areas; it can infect People of all ages but mostly schoolchildren and peasants.

Causes of Bilharzias:

Tiny worms living in pools and stagnant water, which contain aquatic plants and the snails necessary to complete Bilharzias life cycle.

Types of Bilharzias:

Urinary Bilharzias: It infects the urinary system and discharged with the urine.
Intestinal Bilharzias: It infects the intestinal system and discharged with stool.

Means of transmitting the disease to people:

When a human makes contact with polluted water in swimming pools, washing for prayers or walking barefooted, the worms of Bilharzias penetrate into his body from any part of the skin directly to the blood.

How it reaches water:

Bilharzias eggs reach water through urine or stool of sick persons.

Symptoms of the disease:

In Urinary System:

- Patient feels urinary burning and general malaise.
- Appearance of blood in the urine usually at the end of urination.

In Intestinal System:

- Stomach Pain with possible intermittent diarrhea.
- Traces of blood in the stool.

Seriousness of the disease:

- Weakens patients, delaying children development especially, and reduces their immunity to disease.
- Inability to work among adults.
- The following risk is also there if the patient does not receive fast medical care:
  - Hepatic Cirrhosis.
  - Cancer Bladder.

Prevention and control procedures:

1. Treatment of the disease:
   - Find out the infected people, especially among schoolchildren and peasants who work in the water by asking them whether there was blood in their urine or stool.
   - Together with the community leaders, make the necessary arrangements to take the infected people to the health center for chick ups and medications.
   - Follow up the treatment.
     Explain to your community, especially the schoolchildren that it is possible to prevent this disease if all persons (who have signs of blood in their urine and stool) go to the health center for treatment at once.

Explain to people how to avoid the disease:

- Never urinate and defecate in the water or near it.
- Proper use of latrines.
- No swimming, washing or cleaning of clothes in the water where snails are found.
- Usage of long rubber shoes by all those who work in water like farmers.

Organize a campaign with the community leaders to remove all plants from the water where people swim, wash or clean their clothes because plants help snails to exist.

Diarrhea:

Diarrhea means: the discharge of running stool three or more times a day
Seriousness of the disease:
The body loses water and salt, leading to dehydration and ultimate death, especially if such fluids and salts are not compensated for. Diarrhea can have an increasing danger on children and the elderly because of their weak immunity.

Causes of diarrhea:
Small germs living in human stool and animal residues that can get into us by:

- Drinking contaminated water.
- Taking contaminated foods.
- Eating with dirty hands.
- Children can be infected through bottle-feeding.
- Flies and cockroaches play big role in transmitting the disease.

Symptoms and Signs:

- Diarrhea looks like running water.
- Deafness may accompany diarrhea.

If the disease is not treated quickly, the following serious symptoms can be noticed:

- Loss of natural flexibility of the skin.
- Dry tongue.
- Deep eyes
- Cardiac Fast beating.

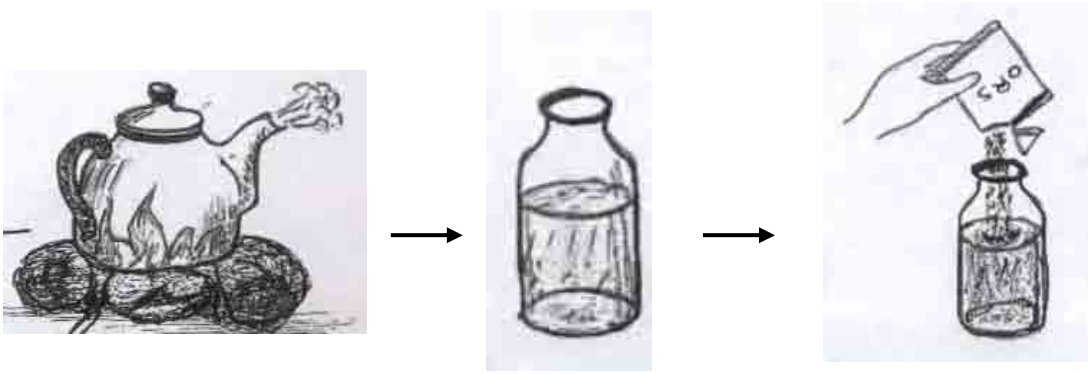
This means that the situation has become dangerous. You must ask the family of the patient to start giving him fluids and salts, and then take him to the nearest clinic.

Treatment of Diarrhea:
It is not advisable to give medications against Diarrhea, but it will be enough to give fluids to patient, through their mouths, in order to compensate the body for the lost fluids. Following are some of the most important fluids:

- Mother's breast-feeding for infants.
- Soup.
- Rice water
- Perfusion solution.

Where can we prepare and get the Perfusion solution:

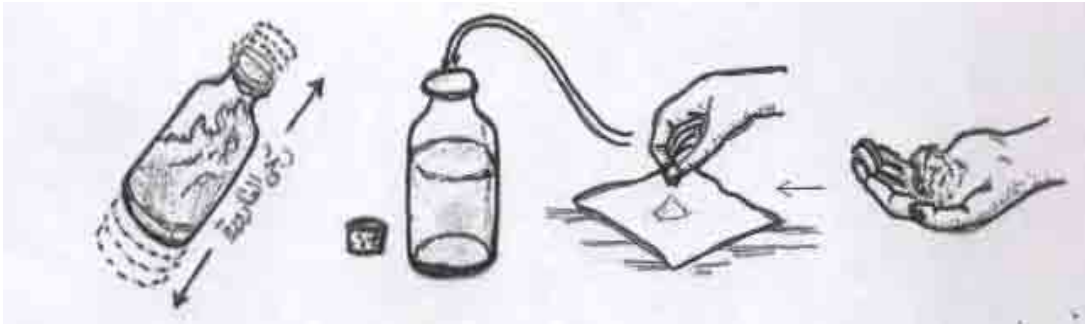
- It is a salty solution prepared to treat the dehydration of the body. It is available in pharmacies and clinics in ceiled bags.
- Method of preparation:
  - Prepare a One-liter clean bottle.
  - Dissolve the bag contents in one liter of clean water that already was boiled and cooled down.
  - Give the patient one cup from this solution whenever he feels thirsty



Boil water | Pour boiled water in bottle. | Add perfusion solution to the water

If the solution is not available, we can prepare another solution at home using the following method:

- Place the following in a clean bottle of half-liter capacity:
- Three-finger grip of salt.
- Four-finger grip of sugar
- Half liter of clean water which was boiled and cooled down.



-Handful of sugar + little salt = you will get perfusion solution
-Shake the bottle

Preparation of Perfusion solution at home

You must teach mothers and patients' relatives how to prepare these fluids with emphasis on their importance and to observe the quantities shown

If diarrhea stops, ask the patient to give up fluids and to take his normal meals, with an extra meal in case of a child.

Prevention from Diarrhea:
Discuss the issue with the community leaders and enlighten people to adopt the following manners:

- Care for personal hygiene by washing their hands with soap and water before and after taking meals, and after defecating.
- Do not drink water from the pool unless it is boiled or exposed to sunshine.
- Keep food clean and well cooked.
- Fight flies.
- Educate mothers on the importance of breast-feeding.
- Immunize children.

Note:
Sometimes an infection in the form of diarrhea means an epidemic, which indicates the infection of many people with the same disease at the same time.
The epidemic occurs when the disease is transmitted from one person to another in a group of people, such as children at school or people in your community.

Characteristics of epidemics transmitted through water:

- Infecting large number of people who are using the same source.
- Infecting all ages without discriminating between young and elders.
- The epidemic can seize when we refrain from using contaminated water, or after water treatment.

When an epidemic, like diarrhea is discovered with such symptoms, immediately do the following:

- Inform your supervisor, community leaders and teachers that an epidemic had begun.
- Ask all members of the community not to drink water before boiling it.
- Search for the source of contamination and stop using it.

Summery: to prevent water-borne diseases, you must do the following:

- Secure a water source sufficient to the needs of the community, conserve it and protect it from contamination.
- Treatment of water before using it.
- Elimination of water contaminators.
- Use water for personal hygiene.
- This is what we will discuss in the following topics.

Third: Water Treatment Prior To Domestic Use

The purpose of water treatment is to remove all the suspended materials and the killing of germs through:

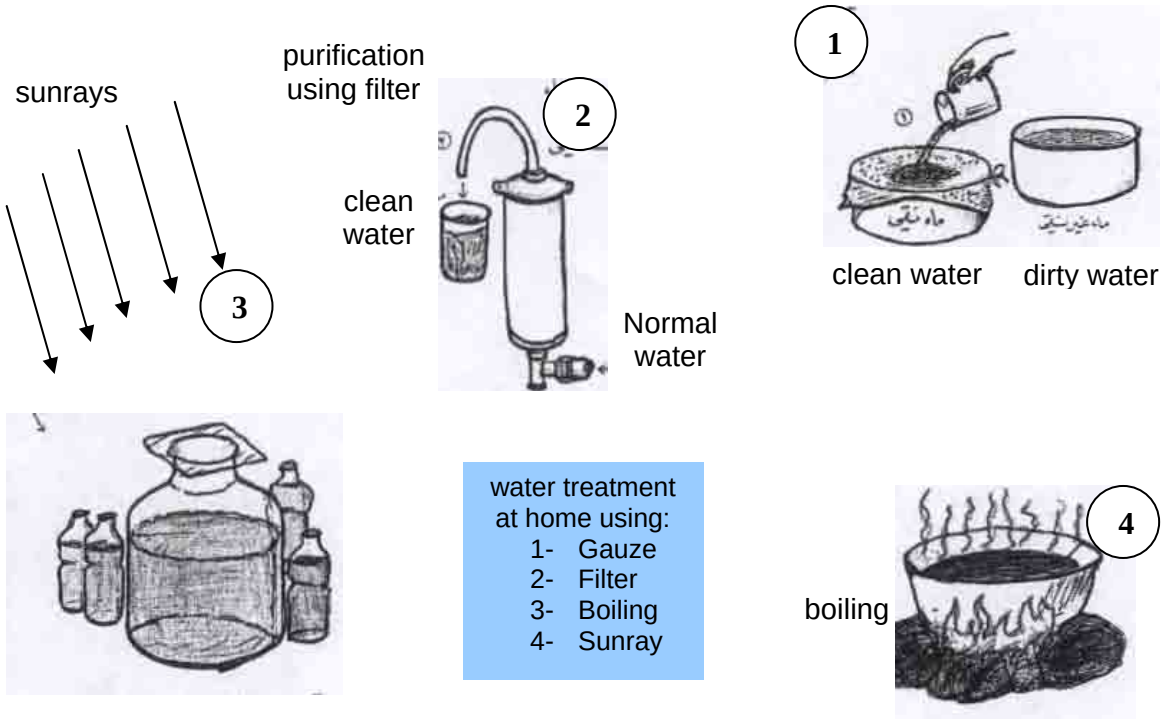
1- Water Filtration:

Filtration means cleaning and purifying water from some germs and worm eggs to make it less dangerous by using a filter consisting of sand and gravel layers. Ready filters are available in the markets. Use a piece of clean cloth with small pores for filtration process.

However, this filtration does not decontaminate the water and make it safe for drinking. Therefore, a decontamination process must follow filtration

2- Decontamination ad sterilization of water:

You can achieve the decontamination and sterilization of water by boiling it for five minutes. This will eliminate the remaining germs. Water can also be decontaminated by exposing it to sunrays through glass bottles or transparent plastic bags for 12 hours at least.



water treatment at home

At this stage, water is pure and safe for all uses

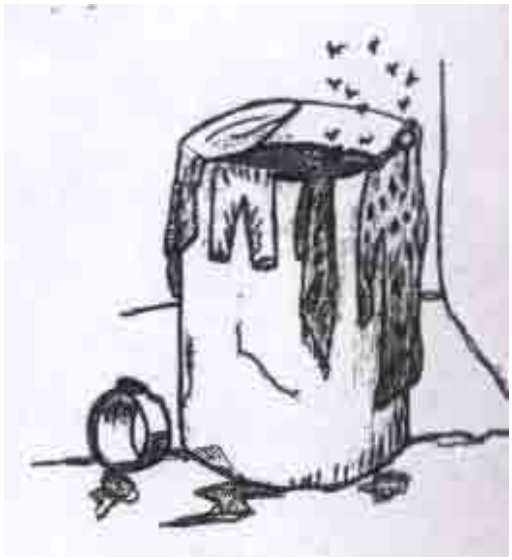
Fourth: Maintaining the Cleanliness of Water and Water Containers:

All filtration and decontamination processes remain useless if we do not use clean water containers. Therefore, it is very important to keep containers clean by adopting the following means:

1. Careful cleaning before filling with water.
2. Use them only for keeping clean water and not for any other purposes.
3. Use permanently tight cover or a clean piece of cloth.
4. Keep them away from reach of dirt and children.
5. Do not put any tools or clothes above them.
6. Do not put dirty hands, cups or scoops inside.
7. It's preferable to take water from the tank using a tap or a clean scoop with a long handle.
8. Do not drink directly from the container opening.

Ideal Domestic Container
Clean with lid, scoop an elevated tap

Unhealthy Container
Because it is without lid, exposed to dust and placed directly to the ground



How to maintain cleanness of water and water containers

Facing the problem of water shortage

Problem of water shortage can be attributed to one or more of the following reasons:

- Lack of water at source (water wells and springs)
- Suspension of project because a malfunction may occur.
- Loss of a quantity of water during collection and usage.

It is obvious that we cannot address the first reason.

Our conversation is limited to handling the Second and Third reasons:

Your success in helping your society is dependent on solving this problem through:

- Community awareness of how serious is the problems caused by scarcity of water on either health or living hood levels.
- Helping the community to realize the real reasons of the problem, and how to solve them.
- Giving special attention to women, on the ground that women form the majority of the group who suffer from the problem of water shortage, in addition to the fact that they are responsible for excess waste of water during water usage.

Solutions for consideration with your community:

- Rationalization of water consumption.

Rationalization of water consumption means the reduction in the quantity of lost water and to stop excessive use whether at home or outside.

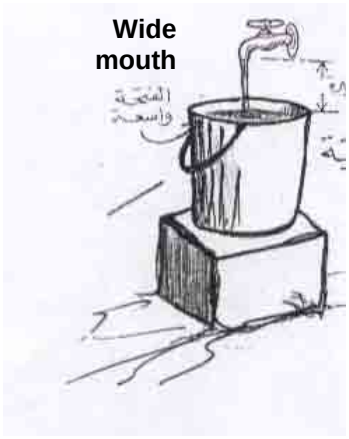
- Remind your community of the Prophet's Sayings (P) which prohibit us from excessive use of water even if we are close to a running river or at sea shore.
- Think of means for helping the community to reduce the quantity of water lost during collection, and how to rationalize its consumption at home and at other places as follows:

A. Reduce the quantity of water lost during collection (**see Figure)**

- Notice water leakage during filling vessels with water
- Ask members of your community, who collect water, to do the following:
  - Use buckets with large opening and covers.
  - Reduce the distance between the tap and the vessel opening.
  - Secure the vessel while filling it to avoid pouring water on the floor.
  - Do not give children the task of collecting water because they tend to play with it, in addition to their inability to control heavy vessels filled with water.
  - Consider other solutions suitable to the state of water in your community.

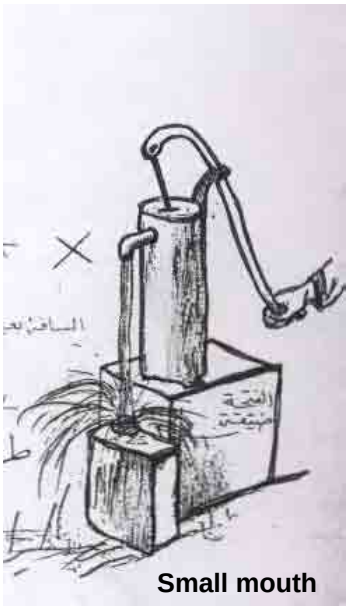
Man is strong enough to carry water firmly

Water is heavy & wasted because a child cannot hold it firmly



Correct way

Long distance



Wrong way to pour water

Filling and carrying water

B. Indoor Rationalization of water consumption:

- Note how water is being used at home especially when washing vegetables, fruits, dishes and utensils.
- Ask individuals about the quantity of water consumed by one person for bathing or for ablution etc….
- There will be many cases of excessive use of water in wrong ways.

Teach them the right way with the following Examples:

- Immerse and wash vegetables and fruits with water for first time. Change water and wash them again using clean water in the same vessel or in a new one.
- When washing dishes and utensils use a basin or a large vessel for washing with soap and clean water, then take them into another basin filled with clean water only to get rid of the soap completely.

- During bathing and washing use a smaller dispenser and pour water in an economical way.
- Ask members of the community to collect washing and bathing water for watering livestock and plants growing near the house.
- Ask mothers to teach their children how to use water for personal hygiene and to remind them of the importance of preserving water by moderate and economical ways, and do not forget the role of the teacher to implant these qualities of moderation in the minds of schoolchildren by setting an example of himself.
- Keep all water-filled containers away from reach of children in safe places to avoid spilling.

C. Outdoor rationalization of water consumption:

At mosque:

- Encourage prayers to preserve mosque' water and remind them of the Prophet Sayings (p) that urge them to do so.
- Advice those not to wash for ablution in the Mosque's water pool if any, and that they should take water in a dispenser to wash outside the mosque.
- Remind them of the importance of ablution at their houses, and how they will be remunerated for this by walking to the Mosque after washing, and that they will be deprived of remuneration if they refrain to do so.

At school:

If water is available at school, discuss with the school headmaster and teachers how they can preserve water in a suitable way for the needs of the school.

Note:

If you find families consuming excessive quantities of water, go and visit them and explain the importance of preserving water. If they do not respond try to influence them through their trusted friends. If this continues, bring it up for discussion with the village Council or the village's Chief through whom you can determine a suitable quantity of water for each family, and to impose extra charges for consuming excess quantities .This can be made noticeable to all families.

Your Obligations:

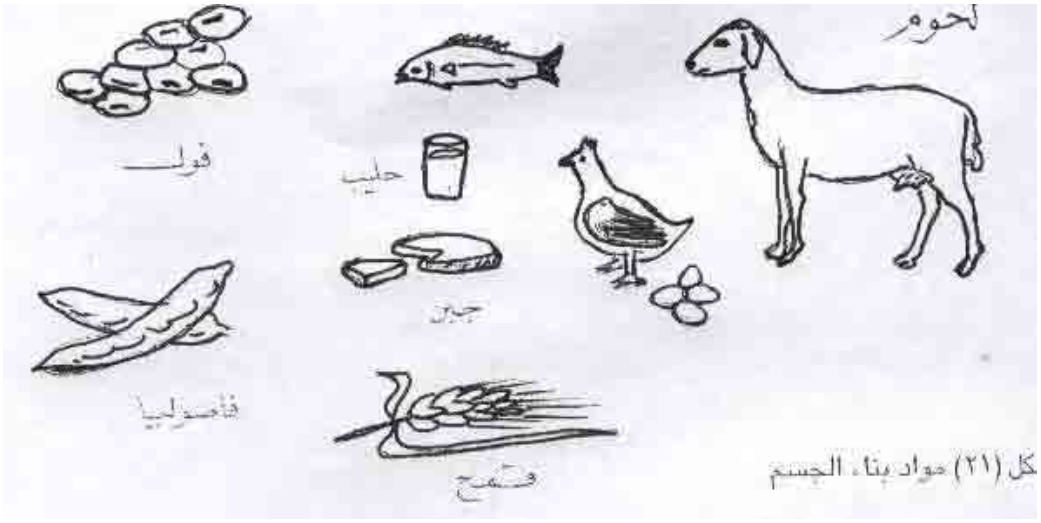
- With full understanding of the water shortage, you have to make clear to individuals, particularly mothers that body and clothes washing is as important as drinking water.
- Teach them that washing prevents skin diseases and the transitions of germs to food and then to humans.
- Teach them that it is better to wash the hall body with water and soap and not tips and face only.

Fifth: Healthy Nutrition

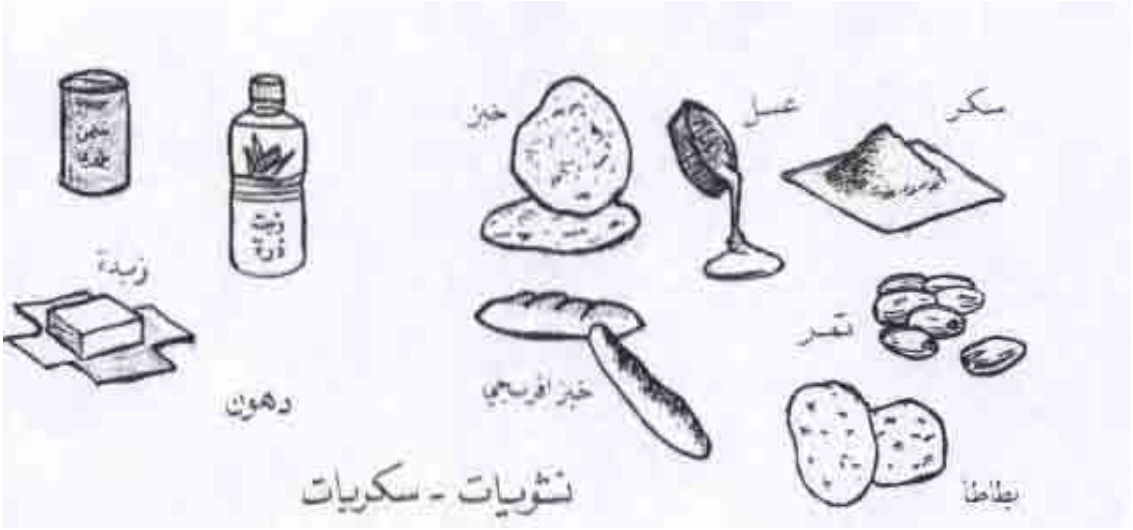
Men depend on food in their growth, activity, ability to work and prevention of diseases. Good nutrition is to take the right foodstuff, which is enough in terms of quantity and quality so that all parts of the body can work in complete harmony to guarantee his capability to do various activities. The proverb says (sound mind in the sound body).

Ingredients of good food:
Explain to your community that the body needs various kinds of food because each one of them is useful to the body, such as:

1- **Body Building materials**:
Materials consisting of protein



2- Energy Materials
Materials consisting of Carbohydrates and Fats



3- Preventive Materials:

Materials consisting of fruits and vegetables

Important points for consideration:

- Make sure that people in your community take varieties of food.
- Direct the community to make use of the local food available in the village.
- Consider the potential of producing good vegetarian and non-vegetarian food in the region and encourage your community to do so.
- Direct mothers to continue breast-feeding, and to refrain from giving infants any food supplements until the age of fourth month.

Protecting food from contamination:

If food is contaminated, it will cause illness, of which some can be lethal enough to lead to death. Therefore, food must remain safe and clean in a proper manner away from flies and dust in clean utensils. Consider the following:

- Wash hands with soap and clean water before preparing food.
- Address all wounded fingers with clean bandages before preparing food to prevent germs existing in those wounds from reaching the food.
- Cooking food:

The purpose of cooking food is to:

- Kill microbes and parasites.
- Make food easy to chew and ultimately easy to digest.
- Food preservation.

After preparing the food, special attention must be given to keep it away from contamination caused by flies, cockroaches and dust by adopting the following steps:

- Cover the plate with its cover or use a piece of fine gauze to cover it.
- Keep it in clean and in a cold place away from reach of children.
- Warm up the food left from previous day before eating. Refrain from eating it if it has bad smell or became rotten.

- Fresh fruits and vegetables:
  - Clean and wash with water before eating them.
  - Keep away from rotten fruit and do not eat them.
  - Do not use human or animal remnants as fertilizers for vegetables.
- Clean and sterilize the children feeding bottle before each use by boiling it in water for ten minutes every two days at most. Keep it always covered and do not leave milk inside it for long time.
- Avoid rotten canned food, which is identifiable by:
  - Inflated can.
  - Signs of corrosion on the can's body.
  - Date of expiry.

  If you see any one of the above signs, this will mean that the can is rotten and dangerous to health. Draw the attention of your community to this point. There will also be available canned food with no clear date of expiry or the place of production, so do not buy such food.

  You must educate your society that canned food contains chemical substances, which are harmful to health, and encourage them to take up the locally produced fresh food because it is free from such substances and rich in nutrition value.

Sixth: Personal Hygiene

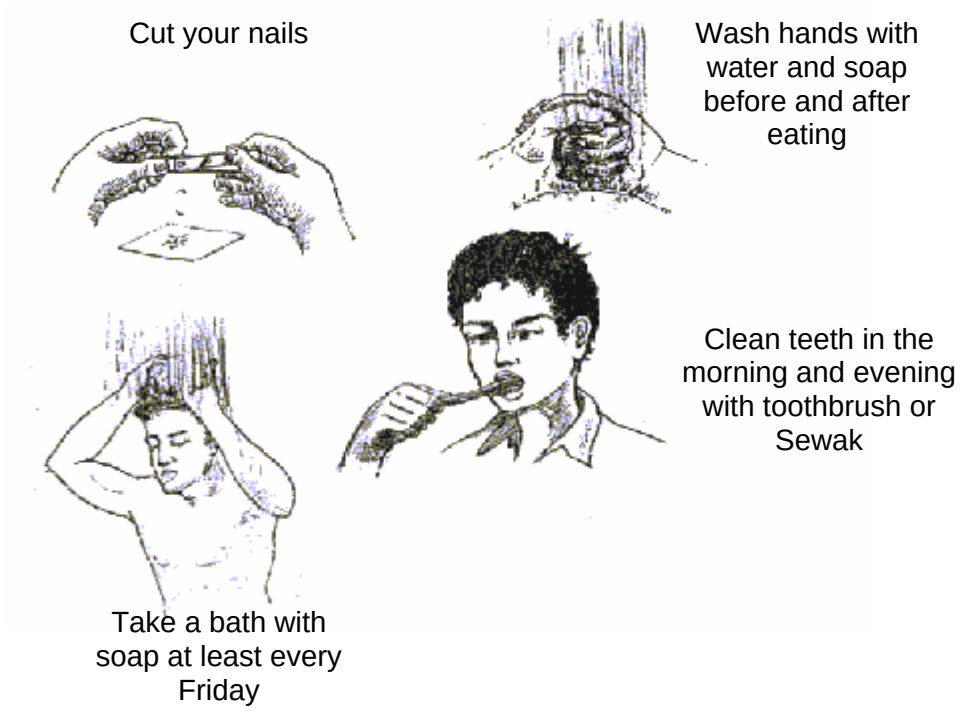
Definition: personal hygiene cares for the health of the individual and to increase their resistance to diseases through:

- **Personal hygiene**

Maintaining personal hygiene protects humans from several diseases, for example: diarrhea, eye and skin diseases, which occur due to the lack of attention to the cleanliness of the body and clothes. Some people in your community may say that the project's water is not enough for bathing and cleaning, and therefore make sure of the following:

- Do citizens of your village suffer from water shortage, which prevents them from caring to bathe and to wash their clothes?
- How many times per week or month does a person bathe in the village?
- Are diarrhea, opthalmia and dermatitis spreading in the village?

Scarcity of water in the village is in itself a problem, what would be the solution to it in your opinion? ؟



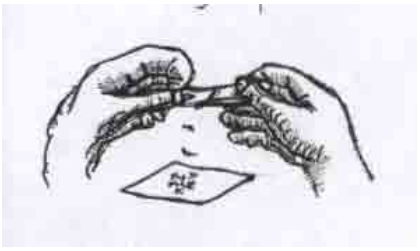
Washing hands with water and soap

- Washing hands with water and soap eliminates all germs on the hands that cause diarrhea.
- Washing hands with water and soap eliminates bad smells and provides feeling of comfort
- Washing hands with water and soap before preparation of food protects the family members from many diseases
- During work and daily practices, many dirt and illness stick to hands, therefore we must care to wash them with water and soap to stop such things from reaching the mouth
- No matter how many times man uses water to wash after contacting stool; it is not possible to eliminate germs unless he uses water and soap.
- It is possible to use local decontaminating substances with water to clean dirt from hands if soap is not available, such as (ashes and green tree leaves.
- Correct ways for protection from diseases are:
  - Washing hands with water and soap after contacting stool.
  - Washing hands with water and soap after cleaning animal remnants.
  - Washing hands with water and soap before preparation of food.
  - Washing hands with water and soap before and after eating food.
  - Washing hands with water and soap after work and touching dirt.
  - If you find difficulty washing your hands with water and soap at all times, it is important to wash hands after contacting stool

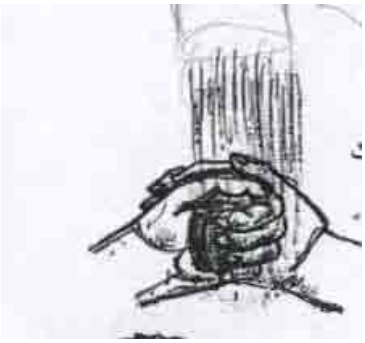
If soap is not available use ashes or green tree leaves

In addition to the above, direct your community to take care of the following:

- Cutting finger nails once a week because they hide germs and dirt.



- Cleanness of hands after work that makes them dirty, especially when leaving the latrine and before and after taking meals.



- Cleaning of mouth and teeth by using the Sewak or a toothbrush with toothpaste.

- Bathing in water and soap once a week at least

- Wash dirty clothes in water and soap, and then hang them in the sun to kill germs and change underwear every three days.

Healthy House:

The house is the center of living for the family where members of the family settle and grow up. Types of houses affect the health of their dwellers. Good houses keep good health, while bad houses can be harmful.

Cleanliness of houses:

- Keep domestic garbage in sealed bags or containers, and bring it to the assigned place for garbage collection every day.
- Frequently sweep and wipe the house to keep it clean with special attention to kitchen and latrine.
- Do not spit or snot on the floor or on the walls to avoid spreading germs.
- Keep animals away by maintaining a special allocated place for them if possible, otherwise you must get rid of their remnants every day to keep the house clean.

Good ventilation:

- Ventilation is necessary for health, and therefore, windows must be opened to allow air circulation to get rid of smoke and bad air from the house.
- Do not allow overcrowded rooms especially at bedtime to prevent the spread of diseases of the Respiratory System.

Stop insects from entering or multiplying in the house through:

- Fix reticulated net on windows.
- Maintain smooth floors and walls free from any cracks or holes where insects and rodents can live.
- Exposure of all blankets and mattresses to sunrays once a week to kill the insects particularly lice and flees.

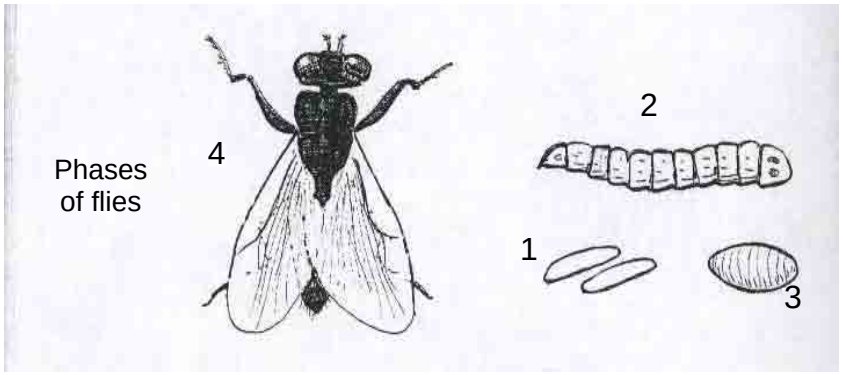
Each house must have its own latrine. All the family must use it and maintain it clean at all times.

Fighting flies and maintaining the cleanliness of the village and public places:

Fighting flies:

Flies transmit many diseases, including diarrhea, eye diseases, cholera and others. Flies multiply in human stool, animal waste, all kinds of garbage, waste materials, rotten corpses and uncovered food.

Help your community to understand the danger of flies' multiplication places, how to find and to get rid of them. Urge people to abide by the healthy methods of getting rid of those wastes, which you already knew when the subject of hard wastes was discussed.



Maintain the cleanliness of the village and the public places:

- Direct each family to clean up the area surrounding its house.
- Help community leaders through the organization of cleaning campaigns every one or two months to clean the village squares by help of the schools children.
- Care more for the cleanliness of the school and discuss the problem with the headmaster and teachers. Remind them of the danger of the spreading of infectious diseases among students. Remind them also to teach the students good hygienic behavior at the school, a thing that will have its effect spreading also outside the school and to the outer environment.
- If there is a market in the village, go and make a visit and note its cleaning problems and discuss such problems with community leaders and reach with them with a proper way to solve that problem.

Remember, and remind the members of your community that:

- Reasons behind spreading a disease in a community are:

The presence of a patient who discharges out the Pathogenic germs with his urine or stool.

Unhealthy behavior of individuals and families in dispensing the wastes, thus resulting in making them reach healthy humans through:

- Contaminated water
- Contaminated food
- Contaminated hands
- Contaminated clothes
- Contaminated Air
- Carriers including flies, mosquitoes, cockroaches and lice.
    - Weak resistance of healthy person because of:
        - Not taking the Necessary vaccination against the six lethal diseases, especially children.
        - Malnutrition
        - Stress at work and shortage of sleeping hours.
        - Negligence of the personal hygiene.

To prevent the spread of diseases, ask your people to:

- Treat patients in the clinics and health centers because an infected person is enough to cause the spread of the disease among other individuals.
- Vaccination of children against the six lethal diseases .
- More consideration to healthy nutrition, giving special attention to children and elders.
- Do not mix or associate with patients or use their private belongings.
- Eradication of disease carriers like (flies, mosquitoes and cockroaches)

Breast feeding and immunization

- Correct and unharmful disposal of human residues.
- Washing hands with water and soap, especially after defecating.
- Preservation of drinking water in a safe place far away from solid and liquid wastes, whether at the source or at home.
- Food protection by covering it, and the cleanliness of utensils used.
- House cleaning.
- Physical hygiene.

Seventh: Sanitation

Sanitation in small communities in Yemen does not receive considerable attention from parents or government agencies who are responsible for supply and drainage. The past ten years witnessed the focusing of attention to supply services that resulted in aggravating environmental problems caused by the lack of drainage services, especially in rural areas, which reflected negatively on the public health, thereby leading to increasing number of diarrhea, which may lead to death among children. This can cause the spread of water related diseases and sanitation like Typhoid, Dysentery, Polio, Hepatitis (A), Cholera, Bilharzias, Malaria, Dermatitis, Opthalmitis and others.

Some villages suffer from garbage piling and the lack of a system for collection and disposal, which ultimately leads to the breeding of flying insects and rodents like flies, mice and cockroaches, which transmit many diseases.

All this had lead to draw the attention to the importance of sanitation and safe disposal of wastes in rural and in urban communities.

However, many complicating problems accompanied this attention due to the inability of local communities in rural areas to gain access to sustainable solutions to sanitation problems.

There is no unified system of sanitation in rural communities and it is left to the House owner to choose the appropriate actions according to his financial capability or its importance to him.

Many villages own and operate projects of water supply without considering sewage. This minimized the importance of this service and the complexity to convince citizens about the necessity to provide their homes with it. They grew up accustomed to living without giving priority to it because they believe it has no effect on public health. On the other hand, many villages still do not have either drinking water supply or sanitation services.

Examples of common methods of sanitation works and disposal of garbage around houses and public buildings in the villages

1) Draining water after showering to an open area behind the house.
2) Draining kitchen water into the streets and alleys as running water, and the disposal of excrement in a latrine designed with a collection pit that can be taken out from the outside and discharged to a nearby larger basin. Then mixing it with ashes and food remnants for a long time to use it as a fertilizer.
3) Designation of a specified area in the yard for defecating and urinating purposes which will be swept at the end of the day or left to dry in place.
4) Provision of draining pipelines from kitchens and bathrooms to a simple pit that tightly closed and covered with panels of wood or tin or logs, or to provide the drainage pipe to deliver to the nearest agricultural field.
5) Usage of latrine is sometime limited to elders and emergency cases, but children are allowed to defecate in the open.
6) All family members are asked to defecate in the open so that human and animal remnants can be used as fuel for cooking or as fertilizer after mixing it with dried herbs, or used in building fences around huts.
7) Disposal of garbage to locations on the streets and alleys of the village, or to any location outside the village.

Wastes are divided into two general types:

First Type -Human liquid waste:

Includes fecal materials, urine and wastewaters from kitchens and bathrooms. Generally, there are two methods of getting rid of this waste:

1. **Dry Method**:
   This method is used in places where there is no public source of water reaching houses. In this case wastes are stored in pits or containers inside the houses or in the yards or gardens for a period of time until disposing them.

2. **Wet Method** (Water Carriage Method):
   This method uses water to carry human wastes into sewage pipes.

Second Type: Solid wastes (garbage):

Includes wastes that cannot be disposed into sanitary pipes such as:

1. Garbage: Kitchen and home wastes.
2. House sweepings: paper, rags, wooden cuts, china and metals.
3. Street sweepings: Dust, tree leaves and animal droppings.
4. Wastes from stables and animal barns.
5. Perished animals like cats and dogs…etc.

Healthful Principles for the disposal of human remnants:

The following principles must be taken into account when disposing of wastes:

1- Waste must not reach water used for drinking, bathing or cooking to prevent the spread of intestinal and parasitic diseases.
2- Waste must not be dropped on the ground to prevent the spread of parasitic diseases like Ancylostoma and Ascaris.
3- Waste must be stored long enough to dissolve before using them for fertilization- special crops eaten uncooked- where the temperature and time can eliminate microbes of infectious diseases and parasitic eggs.
4- Waste must not be accessible to carrier animals or insects like dogs, cockroaches and flies.
5- Waste must not reach food by contaminated hands of the people who prepare or serve the food and by volatilization.
6- Method for disposal of waste must not cause emission of bad smells and must be easy and low-cost to construct and maintain, especially in rural areas.

Healthful methods for the disposal of contaminated water:

We already discussed those Pathogenic germs that can reach water from the following sources of contamination:

- Liquid human remnants (stool, urine, salvia, used water).
- Hard human remnants (garbage, and food leftovers).
- Animal remnants.

How to get rid of those pollutants through healthy methods?

1- Disposal of liquid waste
Components of liquid waste?
Comprising: stool, urine, salvia, used water.

What are the resulting damages and health problems?
The most significant damage and health problems are**:**

1. Degradation of the environment and making it dirty with emission of stinking smells.
2. The proliferation of germs causing intestinal infectious diseases and epidemics.
3. Pollution of the soil, air and water, thus polluting food.
4. Proliferation of flies, insects and other and Pathogenic germs.
5. Transmission of diseases like diarrhea, cholera and intestinal worms from the stool of infected person to healthy person.

Healthful and appropriate means for disposal of latrine remnants:

A- Digestion Tanks:

Simple sedimentation tanks to receive domestic wastewater from one or more houses, residential or commercial buildings, schools, and public utility buildings when there are no sewage systems for collecting, transferring and treating of wastewater.
These tanks partially digest and treat sanitary drainage water. The larger part of solid materials is deposited, and the remaining water can be disposed of by different means.
Solid materials are digested inside these tanks, which are designed in a way to allow removal of solid materials within periods ranging between 3 to 12 months according to the size of the tank and the number of residential houses connected to it.

Specifications and provisions for the digestion tank:

1- Sufficient capacity to handle the quantity of incoming liquids from the houses or liquid wastes, and allowing storage for 24 to 72 hours for residential buildings, and no less than 12 hours for public and other buildings and shops. It must also have an additional space of no more than 50% of its active size for accommodating sludge and scum, with a minimum capacity of 30 cubic meters, and maximum of 36 cubic meters. If the capacity required is more than 36 cubic meters, then more than one tank is needed.

2- Each tank must have two inspection rooms at entry and exit points. It is preferable to use the inspection room at the entry point as a detaining room for non-organic substances in cases of tanks with very large capacities.
3- The depth of liquid at exit point should not be less than 1.20 meter and not more than 1.85 meter. The tank floor should be made with inclination of not less than 1:10 meter towards the exit point.
4- The leveling of the liquids' exit pipe must be lower by at least five cm. from the entry point.
5- The tank must have enough openings of 60×60 cm. at least on top for inspection purposes. Well-sealed lids made from heavy cast iron or from concrete must be provided for these openings and the attached inspection rooms. The tank must be inspected periodically when sludge and scum become higher than 50 cm above the bed of the tank.

B- Drainage Collecting Pools

Water Overflowing from Digestion Tank to the Pools:

Each pool's diameter must range between one to four meters, and to be constructed without a bed, but with walls built from blocks, junk stones or ordinary concrete with suitable thickness .In case its level is high; the pool will overflow. Make sure no underground drinking water sources are nearby to avoid their pollution. The pool's required depth and capacity must be specified. In case the water level drops down below the leakage layer, it will be enough to construct a pool to a depth enough to allow draining by providing sufficient draining side holes and to provide the following conditions:

1. That distance between the entry level of fluids to the pool and the level of the percolated water must allow the draining of the daily quantity of liquid wastes.
2. The pool must be ventilated by a 10cm pipe.
3. Each two nearby pools must be apart by a distance equivalent to three times the diameter of the larger one.
4. The distance between the pool and house foundations must not be less than two meters if its walls are constructed with isolating and solid material, which will not allow any leakage.
5. Provide the pool with inspection hole and cover.

2- Disposal of dry remnants from latrines (stool):

Latrines are the best places where a person can defecate and eliminate the stool's harms, provided they fulfill the following conditions:

2. **Construction wise :**Latrine is preferred to be inside the house in a separate room, but if it is not possible it could be constructed outside the house taking into account the following conditions:
    - Far from clean water pools and water collection sites by 20 meters at least.
    - The way to dispose off remnants must be safe and does not cause environmental pollution.

Whether the toilet is inside or outside the house, it must fulfill the following conditions:

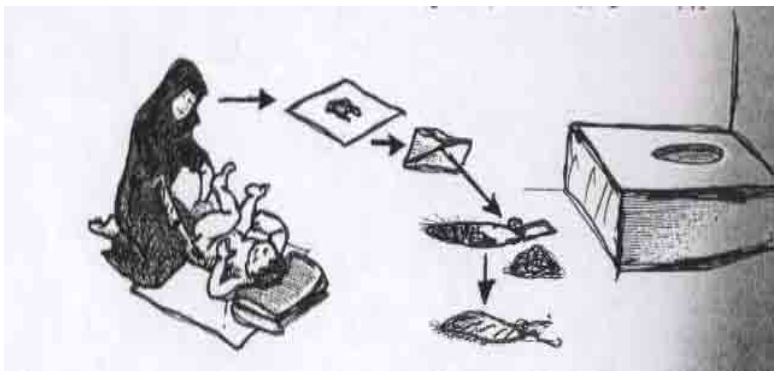
- Roof, walls and floors must be constructed from low cost and locally made materials and easy to clean.
- It must have a window or more for ventilation and lighting.

In dry latrines, a pool must be designed for collecting fecal material in a way to prevent access of rainwater inside it, and prevents leakage of fecal residue from it to soil.

Dispensing stool

Other ways of defecating if there is no latrine, **including:**

- Defecate in the fields and agricultural land, provided:
  - Be at a distance more than 20 meters from homes and water pools.
  - Defecate away from any road or alley keeping enough distance from the road to the pool, shadowed places and children's play grounds. (Recall the Prophet's (p) saying… *Avert the three cursed ones)*".
  - Defecate in a small pit and cover it with dust.
- Disposal of children's stool:
  - It is risky to leave children's stool uncovered.
  - Therefore, it must be disposed of immediately by wrapping it in paper and discarding it in the latrine or burying it into the soil.



Dispensing children's stool

3. **Terms of Use:** For latrine to be used properly, the following points must be considered:
    - Keep it always clean. Wash its floor and cover with water and soap using a special broom for this purpose only.
    - Supply it with personal hygiene materials such as water and soap or water and ash.
    - Never leave stool or urine on the Latrine cover or its tile.
    - Cover the pit after each use.
    - Empty the latrine pit outside when filled or dig an alternative ditch.

With regard to the use of dry latrines' remnants as land fertilizers, the following points must be taken into account:

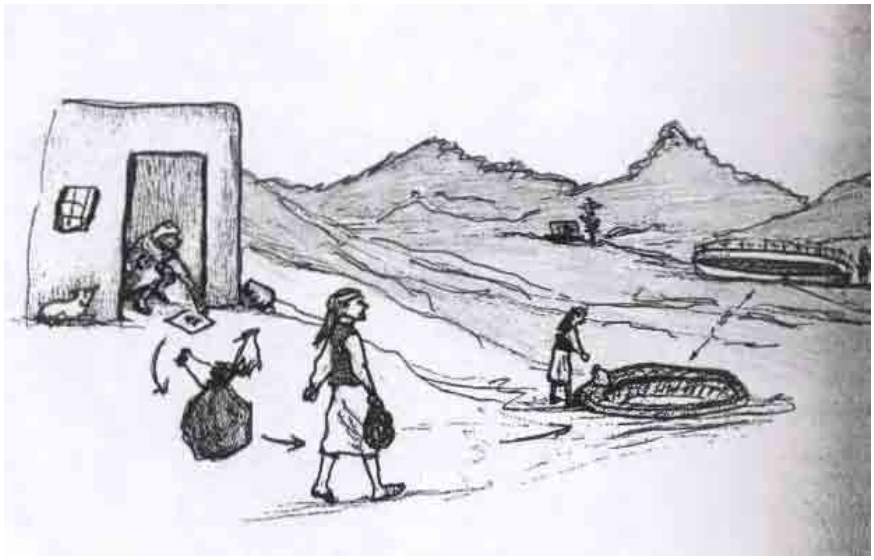
- Do not allow urine and wastewater to mix with stool. Provide an external draining orifice.
- Allocate a receptacle for ashes and dust to be used to cover the stool after each use of the latrine.
- Provide ground collection tank of fasces with a door to prevent stool from leaking outside it. Empty the tank for a period of one to two months.
- Transfer contents of the tank to a pit far from the residential area, pools and water collection site. Leave it for one to two months after covering with ash or sand in order to guarantee its full transformation to fertilizers used in agricultural lands.
- The person in charge of emptying and transporting stool remnants has to observe the following:
    - Use of gloves and long rubber shoes to prevent contamination of feet, legs and hands.
    - Use of a special suit for this kind of work and keep it in a place away from contamination.
    - Must care for his personal hygiene using clean water and soap.
    - Clean place of stool with water especially if inside the house.
    - Teach children from the age of 18 months to use the latrine and to care for their cleanliness and the cleanliness of the person taking care of them.

Disposal of wastewater:

The urine and wastewater contain many pathogens, and if left accumulating on the surface of the ground there is a risk of contamination in addition to it being a suitable place for multiplication of mosquitoes, which transmits Malaria. Therefore, they must be drained in a separate and covered pit.

Disposal of Waste and dry waste:

Waste is all the leftovers from food, cooking, cleaning, sweeping, the remnants of vegetables, fruits and so on.



Harms:

If we leave wastes to accumulate inside or around the house, they become dangerous to the safety and health of people because they will:

- Attract flies, insects and rodents carrying pathogenic germs to people.
- The pollution of water and food.
- Exposing children who are messing around with waste to contaminate any cuts or wounds they have, thus inflecting them with serious diseases like Tetanus.

Methods of making advantage of wastes:

Waste from the plants such as tree leaves, vegetables, fruits and food residue can be collected with the remnants of animals and dump them in a pit after covering with soil .Thus turning them into fertilizer used in agriculture. However, the dumping pit must be far from houses, water pools and the water collection sites by not less than twenty meters.

Proper disposal of wastes:

Proper disposal of waste can be made by adopting the following means:

- Placing wastes in a dumping pit provides proper protection from flies, insects, rodents and others but subject to the following conditions:
  - Be located outside the village at least twenty meters away from the nearest house.
  - Be located on low ground and avoid high places.
  - Be located at a minimum distance of 100 meters from pools and water collection sites.
  - Wastes must not be scattered, but piled up in a dumping pit.
  - A fence supported by earth embankment must surround the pit to prevent rainwater from reaching and sweeping it away, and from children's tampering.

When there is no public dumping pit, then a private pit can be used for burying wastes away from houses and water places, or keep wastes in sealed containers and burn them every week in a place far from the village to avoid smoke and smell.

14. REPORTS SUBMITTED BY SUB-CONTRACTORS

14.1 Report on Workshop for Capacity Assessment

14.2 Pumping Test Report for Lots 1 and 3

14.3 Pumping Test Report for Lots 2 and 4

14.4 Completion Report on Pilot Project Construction Works

14.1 Report on Workshop for Capacity Assessment

Participatory Workshop
Capacity Assessment on GARWSP and Decentralized Local Framework
in Rural Water Supply Service Delivery
in the
REPUBLIC OF YEMEN

WORKSHOP REPORT

Hilltown Hotel
4 – 5 FEBRAURY 2006

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

JAPAN TECHNO CO., LTD.
EARTH SYSTEM SCIENCE CO., LTD.

Reported by
WS Moderator: Abdul Salam Al Zubayri

Participatory Workshop
Capacity Assessment on GARWSP and Decentralised Local Framework
in Rural Water Supply Service Delivery

1. Background

The JICA Development Study (the Rural Water Supply Component for the Study for the Water Resources Management and Rural Water Supply Improvement) has been conducted since December 2005, aiming at the following two major objectives:

1) Formation of practical rural water supply improvement plan in 5 targeted Governorate (Al-Mahwit, Sana'a, Dhamar, Ibb, and Taiz)
2) Capacity assessment and development of GARWSP headquarters and 3 branch offices (Al-Mahwit, Sana'a, and Dhamar) in rural water supply service delivery

This workshop is held as a part of undertakings relating to capacity assessment and development. Current capacity gaps in the implementation of rural water supply project will be identified comparing existing capacities to the defined roles and responsibilities of each stakeholder under decentralized and reformed institutional framework. This workshop facilitates stakeholders' analysis on the organization's capacity and needs. The stakeholders' analysis will be incorporated in the preparation of capacity development and institutional strengthening of GARWSP through the pilot project.

2. Objective

- To understand shared functional responsibilities in rural water supply service delivery among stakeholders involved in the emerging RWSS framework
- To elicit initial perception of the organization's capacities and needs
- To analyse problem and cause for the capacity gap, and identify the possible countermeasures
- To incorporate participants' analysis into capacity development plan of GARWSP

3. Methodology

Participatory workshop tools are utilized in the workshop.

4. Venue

February 4th – 5th (8:30 – 14:00)
Hilltown Hotel, Sana'a, Tahrir the End of Al-Adl St., Near National Museum (Tel: 01-278426/8/9/30)

5. Participants

10 persons from GARWSP Headquarters (10 persons)
5 persons each from 3 GARWSP Branch Offices (15 persons)
1 person each from 17 Local Councils (17 persons) in Target Branches
JICA Study Team (5 persons)

Total: about 55 persons (see annex 2: participants' list)

6. Workshop Contents

(First Day: February 4th)

- 8:30 Registration of participants
- 9:00 Opening Remarks by GARWSP's chairman, the Japanese Team leader, HE the ambassador of Japan in Sana'a, and HE Deputy Minister of the MWE.
- 9:45 Break
- 10:00 Session 1) Introduction: workshop objectives, background on the study, project cycle, development in the water sector, and in the RWSS sub-sector
- 12:00 Tea Break
- 12:30 Session 2) Defining the Roles and Responsibilities for Each Stakeholders in Project/ Program Implementation under New RWSS Framework (group work)
- 14:00 Lunch

(Second Day: February 5th)

- 8:30 Presentation of Day 1 group work
- 9:00 Session 3) Initial Assessment of Capacity Area (group work and presentation)
- 11:30 Tea Break
- 12:00 Session 4) Problem-Objective Analysis (group work and presentation)
- 13:45 Closing Remarks by GARWSP Deputy Chairman after the evaluation of the Workshop
- 14:00 Lunch

Actual Sessions and Detail Outcomes

After introducing the participants to each other and the workshop objectives in addition to the daily schedule, the following activities and outcomes were followed:

Session 1) Overviews on RWSS Sub-Sector Reform and Institutional Arrangement

Objectives:

To overview current RWSS sub-sector reform, and give clues for participants for expected roles and responsibilities of GARWSP Headquarters, GARWSP Branch Offices, and Local Authorities in new institutional framework.

Method:

Presentation by moderator (90 minutes)
Clarification, Question and Answer (30 minutes)

Session 1-1) Historical Background / Institutional Arrangement for RWSS Sector

- Before 1992, GAREWS did not exist. However, RWSS was the responsibility of Rural Water Supply Department which was under the Ministry of Public Works and at a later stage under the Ministry of Electricity and Water.
- General Authority for Rural Electricity and Water Supply (GAREWS) was established in 1992 under Ministry of Electricity and Water
- In the late 1990's, the development of rural water supply systems were implemented under two

ministries: the Ministry of Electricity and Water (MEW), and Ministry of Agriculture and Irrigation (MAI). MEW was operating through GAREWS, while MAI through Regional Development Authorities (RDAs)

- In the year 2001, GAREWS was dissolved, and temporally, all responsibilities with regards to rural water supply were transferred to Ministry of Local Administration
- In 2002, a new body, the General Authority for Rural Water Projects (GARWSP) was created under Ministry of Agriculture and Irrigation (MAI).
- Upon establishing the new Ministry of Water and Environment (MWE) in May 2003, GARWSP was relocated under its authority.

Session 1-2) Overviews on RWSS Sub-Sector Reform

1. Legal and Regulatory Framework governing the Sub-Sector of Rural Water Supply

- Decree No.60 of 2002 establishing GARWSP
- Decree No.218 of 2004 establishing the Ministry of Water and Environment
- Law No.4 of 2000 on local authority
- Draft Rural Water Supply and Sanitation Reform Policy (2004)
- Water Law No. 33 (2002)

2. Other Policy and Strategy Framework

- National Water Sector Strategy and Investment Program, 2005-2009 (NWSSIP)
- Draft National Rural Water Supply and Sanitation Policy-Strategy (2004)
- The NGO and Societies Law
- Rural/Local Development Strategy (2003)
- GARWSP Branch Office Decentralisation Plan (2005)

3. Principles in the Sub-Sector Reform

1) Decentralisation

- Decentralisation of Decision Making at Local Level (District and Governorate)
- Decentralisation of Implementing Functions (Planning, Implementation, Monitoring and Evaluation) to Local Authorities (District and Governorate) and GARWSP Branch Office
- Local Authorities (i.e. Local Councils) being responsible for All Service Delivery including Rural Water

2) Coordination in Sub-Sector Development under Leadership of GARWSP

- Coordination and progressive integration of sub-sector programming and budgeting under the leadership of GARWSP Branch Offices, working in close collaboration with Local Authorities

3) Separation of Policy Making and Regulation Functions

- Separation of policy making and regulation functions from implementing functions with GARWSP Headquarters
- GARWSP Headquarter concentrate its function on policy making and regulation, being a prime agency for rural water supply sector, responsible for sub-sector planning, policy and strategy, monitoring and evaluation, and oversight

4) Introduction of Community-Based Management and Private Sector Participation

- Creation of CBOs (Community-Based Organizations) and/or WUAs (Water Users Association), being registered and vested with legal status for owing, managing, operating and maintaining supply

scheme

- Enhancing capacity of CBOs and WUAs in organizational management, technical operation and maintenance, financial management, etc, through provision of guidance and training by Local Authorities and GARWSP Branch Offices
- Introduction of PPP (Private Sector Participation) in implementation, operation and maintenance, and management of the supply scheme

5) Introduction of DRA (Demand Responsive Approaches)

1. Community Initiatives and informed choices about service options based on their willingness to pay
2. Community contribution in investment cost
3. Community ownership, operation and maintenance, and management of the supply scheme
4. Facilitating community capacity in the scheme management

4. Challenges for Institutional Mapping

- Various Development/Sector Institutions are involved: GARWSP, RWSSP, SDF, PWP, other Development Projects, and Local Authority
- Autonomous PMU (Project Management Unit) approach has been introduced in decision making, planning, implementation, monitoring and evaluation, leading to less cooperation and coordination with GARWSP
- Local Authorities do not yet have the capacity of coordinating the various sector-bases programming of the development institutions in a coherent district-based development plan
- Functional roles and responsibilities in the sector development programme in decentralised framework, in particular, for key actors of GARWSP Headquarters, GARWSP Branch Offices, and Local Authorities, are not clearly understood.

Session 1-3) Objectives of the study

In order to relate the objectives of the workshop to the overall objective of the study, the moderator also presented to the participants brief description of the objectives of the study and the activities which has been accomplished so far. The activities and approaches in addition to the candidate sites were distributed to all participants. The information in the Inception Report was summarized and presented by the moderator as follows:

Introduction

The study for the Water Resources Management and Rural Water Supply Improvement (Rural Water Supply component)

The Study commenced in November 2005 in Japan after the preliminary and the preparatory study teams were initiated in Feb. and June 2005 respectively.

Background

The first Five Years Plan and the main objective of overcoming the water crisis.

The situation of depleting the ground water resources.

Only 25% of the rural population has access to potable water during 2000 to 2003.

The development of the National Water Sector Strategy and Investment Program (NWSSIP) for 2005 to 2009.

The responsibility of the General Authority for Rural Water supply Projects (GARWSP)

Decentralization and capacity building of GARWSP

The involvement of the Japanese International Cooperative Agency (JICA)
The agreement on the scope of the study.

The objectives of the Study are summarized in the following table:

Study Objective	Description
1. Formulation of a practical rural water supply improvement plan	1. Candidate sites: 36 sites in 5 Governorates 1) Al-Mahwit Governorate: 4 sites 2) Sana'a Governorate: 14 sites 3) Dhamar Governorate: 8 sites 4) Ibb Governorate: 4 sites 5) Taiz Governorate: 6 sites 2. Target number of sites for water supply facilities improvement plan: 25 sites
2. Capacity development of GARWSP headquarters and branch offices	1. Targeted institutions: 1) GARWSP headquarters (Sana'a) 2) GARWSP Sana'a branch office 3) GARWSP Dhamar branch office 4) GARWSP Al-Mahwit branch office 2. Method: On Job Training (OJT)

All participants are coming from the above mentioned targeted institutions and districts.

Session 2) Functional Roles and Responsibilities in the Sub-Sector Development Programme

Objectives:
To define functional roles and responsibilities of key actors (GARWSP HQ, BOs, and Local Authorities) by participants

Method:
Preparation of Roles and Responsibility Sharing Chart in Project Cycle by 2 working groups (1.5 hours for group work and 30 minutes for presentation using flipcharts, pin boards, and cards)

Procedure:
- Facilitator introduces the concept of project cycles, and explain activities involved in each phase of identification, planning, implementation, and monitoring and evaluation.
- Facilitator presents blank roles and responsibility sharing chart to the participants
- Participants are divided into two groups.
- One groups discuss and prepare the charts in current situation, while another group prepare the one in future (5 years in future)
- It is followed by group presentation.
- Further clarification would be given on the chart, if necessary, after group presentation
- Each group can add new activities to the project cycle or drop any irrelevant ones.

The group work outcomes are as follows:

A - Group 1 Current Situation

1 – Steps taken for the Identification of Needs

- Requests are collected in the branch offices, discussed, and presented to the local councils at the governorate level (some requests are imposed by GARWSP Head Quarter)
- The request are received from the beneficiaries in a random fashion and handled through the Local Councils, GARWSP, social figures, and governor.
- There is no specific criteria or rules for identifying the needs
- There is no survey for identification of needs
- There is no advance coordination in some districts between GARWSP and the Local Councils.

2- Baseline survey

- Limited baseline survey (not accurate data) related to timing and technical information
- The surveyors are not qualified both in the local councils and GARWSP
- Getting contradictory information and studies

3- Selection of location

- See 1 above

4- Socio-Economic survey

- It is not carried out simultaneously with the technical survey

5- Willingness to contribute by communities Survey

- The branch office usually get the information of willingness to pay but not in a structured manner.

6- Dialogue and negotiation with communities

- Limited

7- Informed choice

- Not implemented

8- Community contribution

- It is practiced

9- Detail Design

- It is practiced by GARWSP engineers

10- Supply Plan

- It is implemented for pipes and pumps and it is done by GARWSP Head Quarter

11- Testing the water resources

- It is implemented by GARWSP

12- Operation and Maintenance Plan

- Partially implemented by GARWSP and the local communities

13- Coordination

- Weak in some districts with the branches
- Limited with the institutions working in the RWSS (LCs, GARWSP, and branches)

14- Responsibility sharing

- Partially and in some cases the LCs share 66% of the responsibilities. Also, in some cases GARWSP share reach 70%, and the share of the beneficiaries can reach to 50%.

15- Financement

- 85% by GARWSP
- 15% by beneficiaries and in some governorates the LCs

16- Community Mobilization

- Not done because there is no financial resources

17- Water Users' Associations Formation (WUAs)

- Beneficiaries committees are formed under the guidance of the LCs and partially of GARWSP

18- WUAs Registration

- Not done

19- Training of WUAs

- Partially by GARWSP

20- Health/Sanitation Education

- Not done because it is not the responsibility of GARWSP

21- Supervision

- Done by GARWSP during implementation. However, the LCs are not supervising the O&M

B - Group 2 Future Situation

The group modified the project cycle as follows:

1- Preparation Phase

- Official procedure for projects' requests should be followed using the area representatives in the LCs. Then to the district LCs.
- GARWSP should conduct all relevant studies after the completion of the requisition procedure by the Local Authorities.
- Preparation of beneficiaries, participation in the selection of level of service and type of project, and their readiness to contribute to the investment and the full responsibilities of O&M. Contribution agreements with beneficiaries should be signed.
- The LCs should pay the cost of the studies and GARWSP branches should provide the studies' teams specially the social mobilization teams

2- Planning Phase

- Preparation of detail technical designs and the estimated cost to be done by GARWSP branches.
- Identification of financial resources and community contributions to the project investment.
- Preparation of bidding documents and specifications
- Announcement, offers analysis, and signing contracts
- LCs agreed to have all bidding process under the responsibility of GARWSP and its branches
- All steps are the responsibility of the branches

3- Implementation Phase

- Handing over the sites to the contractors is the responsibility of the branches and the LCs.
- Supervision of implementation is the responsibility of the branches and the LCs.
- Receiving the projects from the contractors is the responsibility of the branches and the LCs.
- Handing over the projects to the communities is the responsibility of the branches and the LCs in addition to the beneficiaries committees.
- Health and sanitation education is to be implemented through cooperation with the health offices and GARWSP branches.

4- O&M Phase

- Formation of local management committees for the projects is the responsibility of branches, LCs, and Social Affair offices.
- According to the LA Law, these committees should not include LCs members.
- Training of committees on O&M and on management is the responsibility of branches and relevant

institutions such as SFD.

- Training is the responsibility of GARWSP and it is possible to coordinate with other organizations now and in the future.

5- Monitoring and Evaluation Phase

- Monitoring and evaluation of projects operations is the responsibility of the branches and LCs.
- Project management should be assessed by the branches, beneficiaries, and LCs.
- Recording data and information are necessary for analysis to benefit from the lessons learned and should be carried out by beneficiaries' committees and GARWSP branches.

Session 3) Initial Assessment of Capacity Areas

Objectives:

- To elicit participants' initial perceptions of the organization's capacities and needs
- To identify some criteria and indicators for measuring these capacity areas.

Method:

Preparation of Initial Assessment of Capacity Areas for GARWSP HQ and for each of the 3 branch offices separately by 4 working groups. Each group will be led by the branch director (1 hour for group work and 1 hour for presentation using flipcharts). Participants who belong to specific branch office would form one group including Local Councils' representatives of that specific governorate.

Procedures:

- Each group review the Roles and Responsibilities Sharing Chart generated in the previous exercises.
- Each branch office with the participation of the local councils can assess and identify areas of weaknesses that need to be improved and strengths that need to be maintained in their governorate or HQ.
- It is followed by group presentation and discussion with the other groups.

The group work outcomes are as follows:

A – Group 1: GARWSP Head Quarter

Strengths	Weaknesses
1. Clear vision and transparency 2. Having NWSSIP 3. Clear plans, programs, and approaches 4. The existence of the organizational chart GARWSP HQ and branches 5. Availability of job descriptions, tasks, and duties 6. Simple and clear procedures 7. International institutions understand the role of GARWSP in the water sector 8. Availability of the administrative and technical cadre 9. The understanding of the government of the important role of GARWSP 10. The water law 11. Active participation of the LCs	1. Limited resources compare to demand size 2. Several institutions are working in the rural water sectors 3. Basic infrastructure and capacity elements is not completed in the branches 4. Slow response from the international development agencies in the water sector 5. The water situation in Yemen and the water scarcity 6. lack of transportation means in general 7. lack of comprehensive field survey 8. Scattered rural populations and difficult access (more than 100,000 communities) 9. In addition to the continuing increase in rural populations 10. Sanitation projects are not approved yet to be

12. Decentralization (clear plans and programs) as a government general reform program	implemented with RWSS 11. The organizational chart is not approved yet 12. The internal executive framework is not approved yet

B – Group 2: Sana'a Branch office and targeted LCs

Strengths	Causes
1. Basic infrastructure and institutional capacity	• Different sections and personnel
2. Availability of technical cadre	• 3 geologists • 4 civil engineers • 2 technicians and one social specialist • One electrical engineer, one electrical technician, and one mechanical technician
3. Availability of some equipment	• Survey set • 2 well measuring tapes • Biological laboratory
4. Almost complete with financial and administration cadre	• Financial affair and accounting • Procurements and warehouses
5. Monitoring and planning 6. Administration affair	• Financial and administration monitoring + planning and data base • Printing and archive
7. The closeness of the branch to the head quarter	• Easy and fast to get the required information
8. Involving LC at governorate level	• Due to the close coordination with the LC at governorate level

Weaknesses	Causes
1. The implementation unit is sharing the branch space	• No entrance and exit control • The branch needs the office space of the implementation unit
2. Technical and administration cadre	• They need continuous training and qualification
3. Lack of technical equipments and transportation means	• Chemical laboratory and lab technician • Pumping test unit • Pipe set • No transportation means except one damaged car
4. The organizational chart and the executive framework are not clear	• The existing organizational chart is not clear • Job description is not identified in the executive framework
5. No pumping test units	• It is not available with GARWSP HQ
6. The old studies of projects' sites are not used 7. Acceptance is not approved when sites are	• New studies are recommended

selected according to regions 8. Continuous orders from high officials 9. Weak relationship between the branch and the district LCs	• The lack of public interest in the eyes of concerned officials • Out side the scope of GARWSP plan • Lack of regular information about the actual projects' expenditure • Due to the decision taken at the governorate level that only the representatives of LCs at governorate level are in charge of the district water supplies • District LCs are neither participating in the selection of the water supplies schemes nor in the preparation of the budget or regular monitoring

C – Group 3: Dhamar Branch office and targeted LCs

Strengths	Causes
1. The basic infrastructure is almost complete]	• Having office building, warehouses, workshops, equipments, maintenance, and pumping test unit
2. The organizational chart is almost complete	• Conducting studies (geological, civil, and maintenance) • Preparing contracts and bidding documents • Supervision of implementation • Preparing annual programs and plans for implementation in simplified procedures • Complete financial procedures
3. Coordination with local councils	• Joint field visits with the LCs • Solving all community problems before and during project implementation and during project operation
4. Coordination with all relevant institutions	• Social Fund for Development, Public Works project, and Development Project
5. Continuous coordination with the headquarter	• the support of GARWSP leadership offered to the branch

Weaknesses	Causes
1. The monitoring and evaluation	• Lack of transportation means for projects monitoring • Lack of data base in the branch (computer and copy machine ...etc)
2. The operation and maintenance	• Lack of financial resources for training, qualification, and O&M of equipments
3. The preparation	• Lack of social mobilization team (social specialists)
4. Implementation	• Lack of health and sanitation education team • Lack of a lab technician
5. Planning	• Lack of equipments

D – Group 4: Al Mahweet Branch office and targeted LCs

Strengths	Causes
1. Equipments and accessories	• Availability of a transportation mean, survey equipment, fax, copy machine, and a computer
2. Support of GARWSP Leadership	• Understanding and responsive attitude
3. Increasing financial allocations	• Operation budget and per diem for supervision
4. Building excellent relationship with the local authority at governorate level in financing RWSS	• Coordination, implementation, and participation

Weaknesses	Causes
1. Lack of office building and warehouses	• Lack of the required land for construction of office building and warehouses in addition to the lack of finance
2. Not hiring the contracted staff and not providing the minimum number of cadre	• The headquarter has its reasons
3. Lack of pumping test unit	• The headquarter has its reasons
4. Lack of measuring and survey epuipments	• The headquarter has its reasons
5. Lack of complete authority delegation to the branch	• The headquarter has its reasons

Suggestions and recommendations
• Providing enough financing for the organizational and institutional capacity building
• Employ the contracted staff and providing the branch with a geologist and a technician
• Rate the branch as “A” level

Session 4) Problem and Solution Trees

Objectives:

- To identify one or two core problems which are considered to be the main obstacle that a branch office or HQ is facing within the project cycle and preventing proper implementation of RWSS.
- To assess the causes and effects of such problems.
- To suggest practical solutions.

Method:

The same 4 groups as in the previous session will workout this assignment (1 hour for group work and 1 hour for presentation using flipcharts).

Procedures:

- Each group and based on the project cycle, it will identify specific core problems.

- For each problem, the causes and effects will be identified by the group.
- Practical solution would be suggested for each problem in a participatory manner.
- Each group would present its findings to the rest of the participants.

The group work outcomes are as follows:

A – Group 1: GARWSP Head Quarter

The problem	Cause	Effect	Suggested solutions
Shortage of cadre qualification	Weak financial resources	Duties are not carried out well	Regular training for the cadre
Shortage in equipment and tools	Weak financial resources	Duties are not carried out well	Providing required equipments and tools
Central laboratory is poorly equipped	Weak financial resources	Duties are not carried out well	Providing required equipments, materials, and accessories
Lack of comprehensive survey for all governorates	Weak financial resources	Duties are not carried out well	Allocating financial resources necessary for the surveys
Shortage in data collection	Weak financial resources	Duties are not carried out well	Providing equipment and programs for establishing data base for RWSS
Required water tests can not be done thru the weak central lab	Weak financial resources	Shortage in performing complete water tests	Providing field and lab tests and providing the necessary materials

In relation to Project cycle:

The problems	The solutions
Lack of comprehensive studies for the pojects	Providing the necessary equipments for the studies
Shortage in qualified cadre to conduct the surveys	Regular training for cadre qualification
Central laboratory is poorly equipped	Providing field and lab tests and providing the necessary materials
Shortage of tools and equipments in the central workshop	Mobile workshop are required for project operation and maintenance
Transporting engineer to supervise and follow up field work	Providing complete transportation means
Shortage in data collection and analysis	Providing equipment and programs for establishing data base for GARWSP headquarter

B – Group 2: Sana'a Branch office and targeted LCs

The problems	Causes	Effects	Suggested solutions
1- lack of transportation means	The plan was not implemented	Unable to conduct field visits, monitoring, duties were not done on a timely manner, negative effect on the quality and type of work	Providing 3 cars for the branch

2- the work environment is not enabling during working hours	Too many people	The branch can not perform its duties during working time	The implementing unit should be moved away from the branch office
3- the projects are not selected properly and priorities were not identified	LCs at district level were not given the authority in the selection, ranking, and approving process	Difficult projects to be implemented and some projects don't reflect the priority situation	To give the LCs at district level the authority to directly contacting the branch office and also its role in project implementation
4- the cost of the studies which is from the LC at governorate level and from the beneficiaries is not given to the branch	The agreement between GARWSP and the governorate is that LC is responsible on the cost of the studies	The studies are not conducted properly	Per diem should be paid officially by the governorate, GARWSP, or LCs
5- lack of complete data base	Lack of financial resources to carry out field surveys	Selection of projects are not selected properly	Providing the financial resources to buy the necessary survey equipments
6- social studies are not conducted properly during project implementation	Lack of financial resources	Lack of project sustainability	Providing necessary financial resources for the social studies
7- community contributions are centrally imposed by GARWSP and governorate	LCs are not involved to get written agreements	Lack of response and delay of work and projects become difficult to implement	Willingness to pay survey should be conducted and formal agreements should be reached with LCs and beneficiaries
8- LCs are not involved in receiving the completed work from the contractor	There is no form for such activities	Some boreholes exposed to private use and some back filled	Modify the receipt format in order to for the LCs to formally receive the boreholes
9- lack of well tests before starting the implementation of the projects	Lack of pumping test unit in the branch and the cost of testing is too high to be paid by beneficiaries	Discovering that the water source has no water after project implementation	Providing pumping test unit in the branch and training of the cadre
10- lack of M&E program after handing over the project to the beneficiaries and during the O&M phase	Lack of financial resources for the branch and the LCs in addition to the lack of technical equipments	Some projects stop functioning	Providing continuous financial resources for the branch in addition to international support in training, data, and technical equipments

C – Group 3: Dhamar Branch office and targeted LCs

The problems	Causes	Effects	Suggested solutions
Transportation means	Lack of resource in GARWSP	Reduction in the number of field visits and project follow ups	Providing transportation means
Data base system	Lack of resource in GARWSP	Lack of sufficient and accurate solutions	Providing the means
Equipments and tools	Lack of resource in GARWSP	Reduce the branch activities	Providing the means
The branch needs training seminars	Lack of resource in GARWSP	Unqualified cadre to carry out project implementation	Organizing training seminars

In relation to the Project cycle:

The problems	Causes	Effects	Suggested solutions
The branch office can not perform some of its duties	Lack of transportation means	Difficulties to implement the projects	Providing transportation means
	Financial resources of the branch is insufficient		Increasing financial resources for the branch
	Lack of some important equipments (survey equipments, computer, and copy machine)	Lack of documentation of data	Providing the equipments (survey equipments, computer, and copy machine)
The branch office can not perform some of its duties such as: • Monitoring and follow ups	Lack of transportation means	Lack of follow up and project deficiency	Providing transportation means
• Preparation, planning, and documentations	Lack of some important equipments	Deficiency in the preparation, planning, and documentations	Providing the equipments (survey equipments, computer, and copy machine)
	Lack of social mobilization team	deficiency in the awareness process	Employing specialists

D – Group 4: Al Mahweet Branch office and targeted LCs

The problems	Causes	Effects	Suggested solutions
Preparing comprehensive studies	Lack of specialist cadre Lack of technical equipments such as (GPS) …etc. Lack of transportation means for field visits Lack of required financial resources for conducting studies and supervision	The projects are not implemented	Solving the mentioned causes
Facing social problems	Inability to identify correct sites for the projects	Project failure	Conducting social studies in advance

Annex 1

Evaluation of Workshop by participants

Result of workshop evaluation
Only 33 forms have been received

What is your opinion on the following:	Not good	Average	Good	Very good	excellent	No. of errors
WS organization	0	4	10	12	5	2
Topics covered in WS	0	0	7	17	7	2
Relationship of topics to the objectives of WS	0	0	8	9	16	0
Participation level in session activities	0	1	7	17	8	0
Increasing you knowledge	0	0	11	13	8	1
Level of benefits gained from WS	0	1	7	15	7	3
Performance of the moderator	0	0	11	11	11	0
Used illustration means	0	1	14	13	5	0
Location of WS	1	10	12	8	2	0
Services	2	15	9	3	3	1
Total points	**3**	**32**	**96**	**118**	**72**	**9**

What did you like in particular? Responses:	Frequency
The reactions and the involvement of GARWSP and LCs	14
Performance of the moderator and his capacity	8
The transparency during discussion	5
The interest and follow up of the donors agencies	2
The topics which were discussed	6
The workshop approach	4

What did not you like? Responses:	
The way some participants talked	1
The time is not enough and the period is short	12
Some branch directors have difficulty understanding	1
There were no documents of implemented regulatory framework	2
Some participants did not stick to the topics	8
The small space where the WS was conducted	2
The number of female was not sufficient	1
Topics were not co-related	3
Hotel services	2

What should be done in the future? Responses:	
Better location and better services	4
Providing enough time for such WSs	3
Better organization and better services	6
Selection other governorates for conducting WSs	1
The workshop should be organized only for GARWSP branches and LCs only	1
Follow up of WS	1
Implementation of what was studied in real life	2
To clarify the objectives and what is required of such WSs	2
Good coordination with stakeholders	4
More WSs and training seminars	10
To cover more participants	4
Support RWSS projects and the branches	2

Providing the participants with relevant legal documents	1
Coordination with the LCs in general	2
Problem identification in order not to expand	1

Note:
In general, the evaluation of this WS indicates that the workshop is a successful one. However, if the participants of any workshop are not happy with a particular item in the organization of the workshop, services, or the location, it usually leaves negative effect on the evaluation.

Project cycle and the ranking by participants

Project cycle	Activities/capacity areas	No. of votes	Ranking
Identification	Identification of needs	15	**1**
	Preliminary survey	9	**5**
	Community selection	7	**6**
	Socio-economic survey	6	**7**
	Willingness to pay survey	3	**10**
	Community dialogue	1	**12**
	Informed choices	0	**13**
	Community contribution	11	**4**
planning	Detail design	5	**8**
	Supply plan	0	**13**
	Water resource plan	0	**13**
	O&M plan	6	**7**
	Coordination	7	**6**
	Responsibility sharing	2	**11**
	Financement	3	**10**
Implementation	Procurement	0	**13**
	Contractor	0	**13**
	Supplier	0	**13**
	Construction	0	**13**
	supervision	1	**12**
	Community mobilization	3	**10**
	WUAs formation	2	**11**
	WUAs registration	0	**13**
	Training of WUAs	2	**11**
	Health/sanitation education	0	**13**
	Project handing over	1	**12**
	Ownership arrangement	0	**13**
	Management arrangement	5	**8**
	Community contracting out	2	**11**
Monitoring and evaluation	Regular monitoring	13	**3**
	Technical operation	7	**6**
	Financial management	1	**12**
	Conflict resolution	2	**11**
Enabling environment	Priorities and policy making	0	**13**
	Training and skill development	2	**11**
	GARWSP Decentralization policy	14	**2**
	Policy formulation	1	**12**
	Action plan	0	**13**
	Staffing	4	**9**
	Equipment	2	**11**
	Sector coordination	1	**12**
	Project implementation manual	0	**13**

Annex 2: participants' list

Participatory Workshop for Capacity Assessment of GARWSP
and Decentralized Local Framework in Rural Water Supply Service Delivery
4th and 5th February, 2006

Attendants

Name	Position	Authority	Governorate
Ali Ali Alamad	Representative of Authority	GARWSP HQ	Sana'a
Yahya Al-Shami	General Director of Studies and Supervision	GARWSP HQ	Sana'a
Ali Al-Raboue'i	General Director of Planning and International Cooperation	GARWSP HQ	Sana'a
Fawzi Al-Khirbash	Deputy General Director of Planning and International Cooperation	GARWSP HQ	Sana'a
Abdullah Hmud	General director of branches	GARWSP HQ	Sana'a
Abdullatif Salah	Director of public relation and media	GARWSP HQ	Sana'a
T. Amer Sharaf Al-Mushki	Service Director/ Training Director	GARWSP HQ	Sana'a
Abdullah Abdulmalek	Head of Technical Office	GARWSP HQ	Sana'a
Ahmed Mohamed Qammaz	Deputy of Technical Office	GARWSP HQ	Sana'a
Qae'd Al-Darweesh	Member of Technical Office	GARWSP HQ	Sana'a
Mohamed Al-Hamam	Member of Technical Office	GARWSP HQ	Sana'a
Abdulqaher Ali Ahmed	Member of Technical Office	GARWSP HQ	Sana'a
Abdulkarim Abdulnor	Member of Technical Office	GARWSP HQ	Sana'a
Hussien Al-Sha'abi	Laboratory	GARWSP HQ	Sana'a
Namat Al-Majthoub	Civil Engineer	GARWSP HQ	Sana'a

Name	Position	GARWSP Branch Office	Governorate
Abdul Ghani Al Gazali	Director of Sana'a branch	Sana'a branch	Sana'a
Hussien Al-Raqb	Deputy Director of Sana'a branch	Sana'a branch	Sana'a
Fu'ad Muqbel	Director of planning	Sana'a branch	Sana'a
Ali Fare	Director of monitoring	Sana'a branch	Sana'a
Enas Fawzi Al-Sama		Sana'a branch	Sana'a
Abdulmalek Fare	Director of Dahmar branch	Dahmar branch	Dahmar
Aref Al-Hamadi	Director of projects	Dahmar branch	Dahmar
Abdul Ghani Hajer	Director of planning	Dahmar branch	Dahmar
Yahya Al-Shehari		Dahmar branch	Dahmar
Ahmed Al-Rajami		Dahmar branch	Dahmar
Mohamed Al-Nuzayli	Director of Al-Mahweet branch	Al-Mahweet branch	Al-Mahweet
Yahya Abdul Rahaman		Al-Mahweet branch	Al-Mahweet
Najeeb Yahya Al- Nuzayli	Director of Studies Department	Al-Mahweet branch	Al-Mahweet
Amen Saed Al-Mahweti	Director of planning Department	Al-Mahweet branch	Al-Mahweet
Khadijah Rabee'a Al-Reda	Planning	Al-Mahweet branch	Al-Mahweet

Name	District	Affiliation	Governorate
Abdulwahab Muhsen Saree'a		Sana'a branch	Sana'a
Naji Farhan	Nehm	Local council	Sana'a
Ali Mohamed Mo'ajab	Hamdan	Local council	Sana'a
Abdulaziz Sha'lan	Al Taial	Local council	Sana'a
Ahmed Al-Taheri	Al-Hesn	Local council	Sana'a
Abduh Esmai'l	Jehana	Local council	Sana'a
Ali Alqadimi	Belad Al Rous	Local council	Sana'a
Mohamed Al-Ghawali	Sanhan	Local council	Sana'a
Abdulmalek Al-Ta'efi	Bani matar	Local council	Sana'a
Hasan Hadi Al-Hashishi/ General Secretariat Mathhar Ahmed Al-Zawar	Al Haymah Al Kharijiyah	Local council	Sana'a
Radfan Said Saleh	Al Haymah Al Kharijiyah	Local council	Sana'a
Mahmoud Al- Jabeen	Duran	Local council	Dahmar
Hussien Wasel	Jabal Al Sharq	Local council	Dahmar
Hussien Hashem Al Kibsi	Ans	Local council	Dahmar
Ali Al-Jarbani	Mayfa'a	Local council	Dahmar
Abdulwahab Abeed	Bani Sa'ad	Local council	Al-Mahweet
Abdullah Mohamed Al Kanes	Al-Mahweet	Local council	Al-Mahweet
Saleh Yernaji Al-Soufi	Al Khabt	Local council	Al-Mahweet
Adulhamid Al Yemani	Al Rujum	Local council	Al-Mahweet